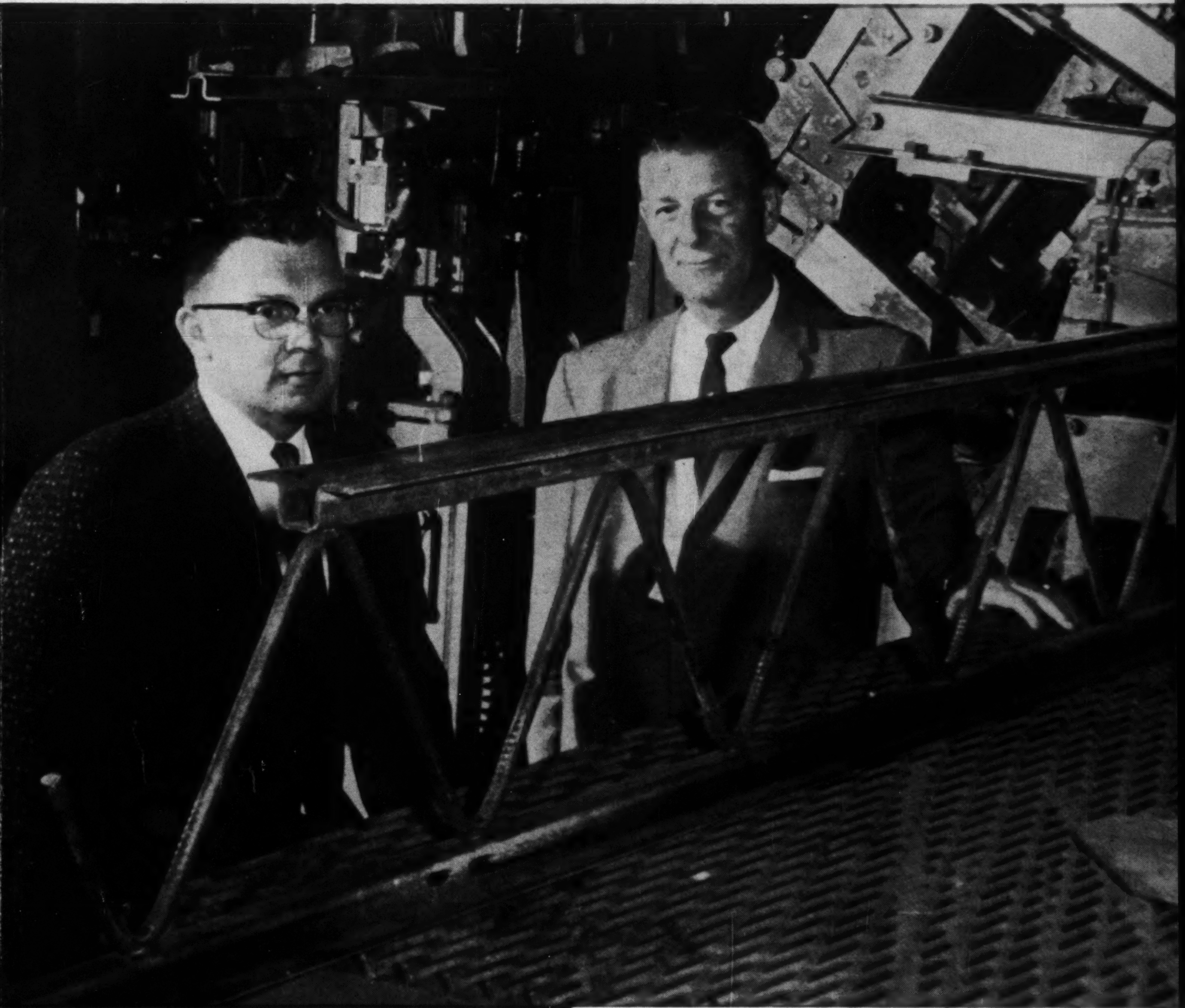
IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication SEPTEMBER 22, 1960



• United Welders' Guenther and Kamnitz:

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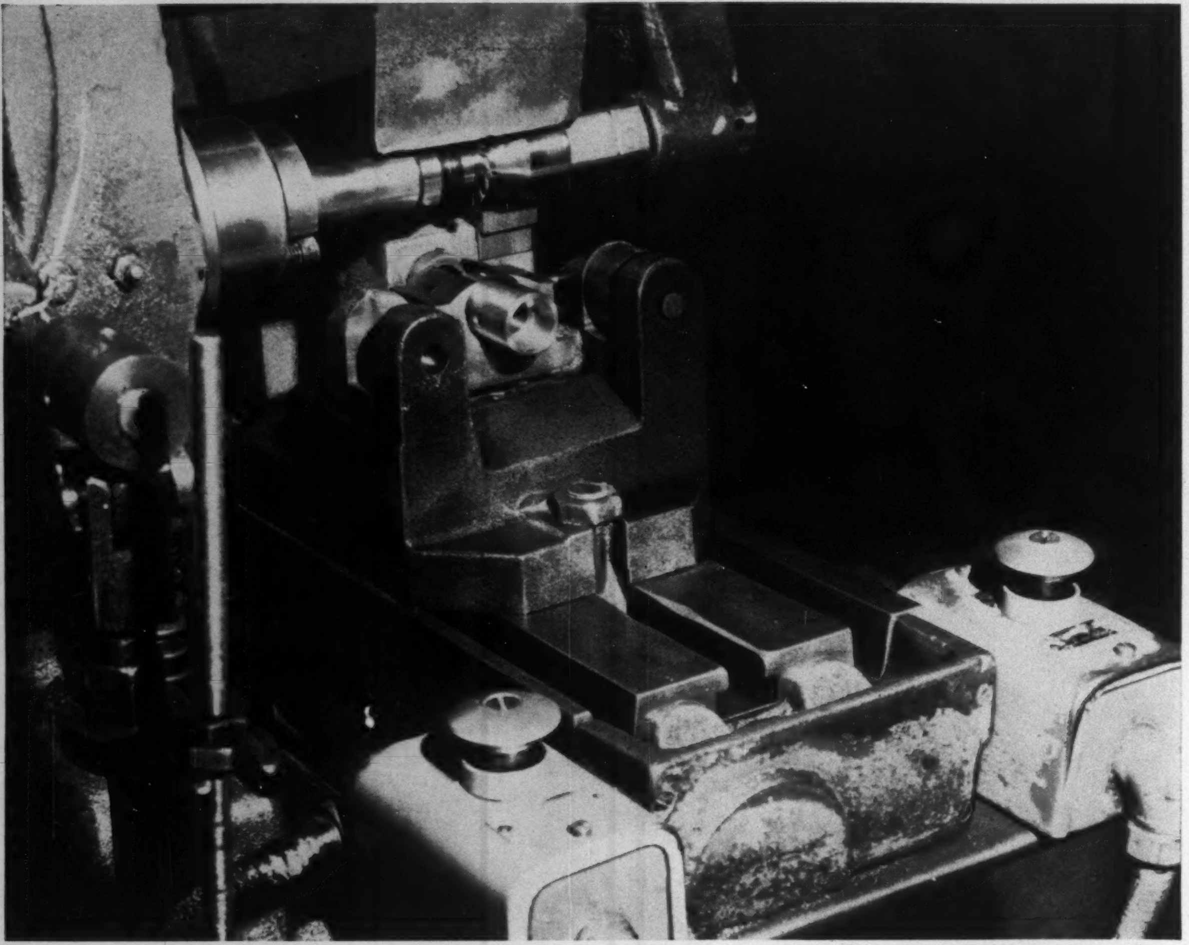

Photo courtesy The Maytag Company

Aristoloy Leaded 8620 cuts tool changes 50% on wringer drive sleeve for Maytag

Has working time been reduced? Yes.

In what way? The use of Aristoloy Leaded* has increased tool life and reduced downtime for tool changes.

Has machining been improved? Yes.

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What operation is performed? Automatic screw machines bore, counterbore and cut off. Secondary operations include milling, drilling, internal and external grinding after carburizing.

For complete information about Aristoloy blooms, slabs, billets and bars, in carbon, alloy, stainless and leaded, call the Copperweld representative in your nearest large city—or write for NEW PRODUCTS & FACILITIES CATALOG.

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The IRON AGE

September 22, 1960—Vol. 186, No. 12

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News of the Industry

INDUSTRIAL RADIO

The Boom Is On—Builders of industrial radio equipment are pushing to keep up with sales demand. The reason: More companies are installing systems for plant and office use. P. 59

COMPACTS VS. STANDARDS

The Losers—A comparison of materials used in compact cars against standard lines pinpoints what materials are taking a loss. Steel is the big tonnage loser. Eventually, "plus" factors should more than make up for short-term losses. P. 61

PERSONAL ADVANCEMENT

Have a Program—A personal plan is needed to move ahead. In the third and last of Dr. F. J. Gaudet's articles on executive success, he makes practical suggestions for such a plan. Merely piling on more college-level courses, or getting more job experience is not always the answer. P. 62

Metalworking

Cover Feature

JOIST AUTOMATION—United Welders' president, C. F. Kaunitz (right), and top engineer, C. H. Guenther, put a new automation line through a shake-down run. This line forms assemblies at joist-per-minute rate. P. 97

CAPITAL SPENDING

The Outlook—The IRON AGE survey on coming capital appropriations shows metalworking industries cut back new appropriations for capital goods spending is the second quarter of 1960. A dropoff in actual spending can be expected in the first quarter of 1961. P. 69

Engineering-Production Developments

SHAPED CHARGE

Forms Aluminum Door — Explosives have a great future in metalworking. They can be used to forge simple, one-sided parts—of almost any size—to close tolerances. Each explosive charge serves a dual role. It replaces both forging press and male die. Thus, the cost of explosive-forging equipment is low. P. 100

CHIP DISPOSAL SYSTEM

Accents Safety—Chips, both flying and standing, present problems in most automated machine shops. A well-designed removal system is now cutting down on accident rates. This chip remover also saves hundreds of manhours at a major airframe plant. P. 102

REDUCE IRON PELLETS

Gas Reactions Are Key—Many elements play vital roles in the reduction of iron ore. Hydrogen, carbon and oxygen are present in the gas phase. In the ore, carbon, silica, aluminum, magnesium and other elements are present—in addition to iron and oxygen. When reduction occurs, the active reducing gases combine with the undesirable elements in the ore. Carbon monoxide and hydrogen serve as the reducing gases. P. 104

ZIRCONIUM PRODUCTION

Hits Peak—Continued demands for zirconium have taken it from the rare-metal realm. High production methods keep the supply line flowing. Zirconium has found extensive use in the nuclear-reactor field. It serves as a cladding material. This cladding application has led the way to new processing methods. P. 107

Market and Price Trends

REPORT TO MANAGEMENT

What Worries Businessmen—High on the list of executive worries are smaller profit margins, increasing costs, and greater competition, at home and overseas. Despite slump in '60, they are confident about long-term trend. P. 67

AUTOMOTIVE

Questions Answered? — Automakers hope 1961 models will hold the answers to many questions. They'll know soon as cars start appearing in showrooms next week. But steelmakers have their share of questions, too. P. 79

WEST COAST

Shift Means Expansion — A change in the pattern of defense spending has created a shift in the market throughout the Pacific Northwest. To meet this shift, many industries are undergoing major expansion programs. P. 83

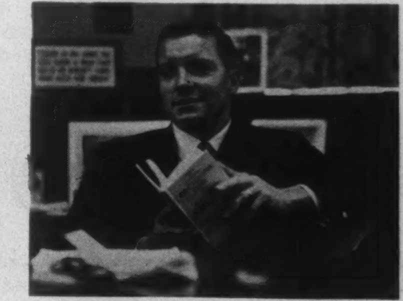
STEEL SUMMARY

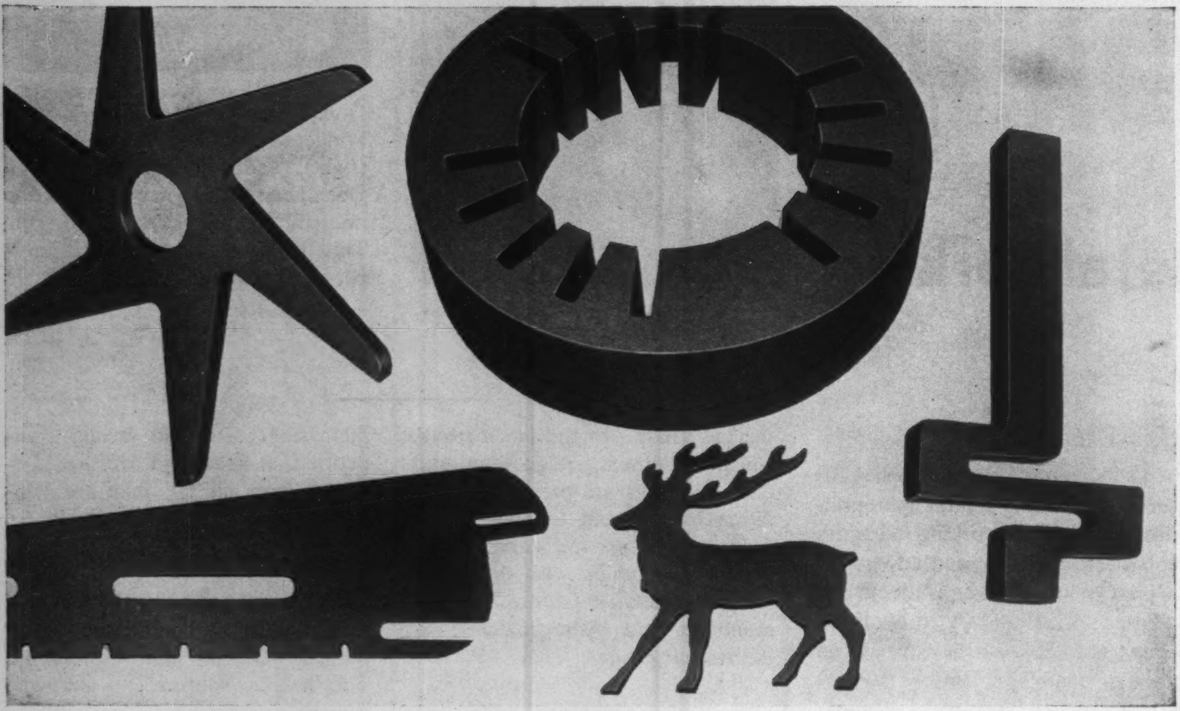
Little Improvement — Gains in steel orders are seasonal at best. This could mean there will be no significant upturn in steel operations through this year. October is now written off as a recovery month. First November business shows little encouragement. P. 129

NEXT WEEK

1960 ELECTION

The Business Issues — Political and business philosophies are often closely related. Next week, Charles H. Percy, Chairman of the Republican Platform Committee and Board Chairman of Bell & Howell, discusses the business issues in the 1960 presidential campaign.





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Our International Image: How Much Must We Change?

Our world relations are a major factor in the presidential campaign. A lot of our interest centers around how our leaders will handle Premier Khrushchev. But just as many of us are worried about Africa and South America.

So-called isolationism appears to be dead. Many citizens feel strongly that our entire world relationships should be put under the microscope. Yet both candidates steer clear of any suggestion that we should withdraw and become a Fortress America. Perhaps we are becoming more realistic about foreign relationships.

If we have not reached that point, it is about time we did. The man who becomes our next president will rise to greatness or fall to something less than that depending upon how he leads us. Certainly we cannot continue to be a naive Big Brother willing to pick up the bill for all the ills of the world.

Our next administration should review the whole foreign relations program. It should review also the men, the staffs, and the policies which mold our image abroad. Since the ill-fated events of Suez, our nation appears to have grown up by leaps and bounds.

Our realistic program for South America is a combination of American faith in democracy and down-to-earth insistence that our friends also show their faith and determination. It might be to the point if a little more of the Latin American plan found its way into our programs for less privileged nations in Asia. And, for that matter, if it were extended to some of our more privileged friends elsewhere.

The time has come when the money and help we give must be accounted for. The stewardship should pass from an emotional "we-can-afford-this" stance to one of realism based on a study of people and nations—as they are, not as they seem to us. That does not mean we must, overnight, become cold-blooded, penurious or lacking in imagination and idealism.

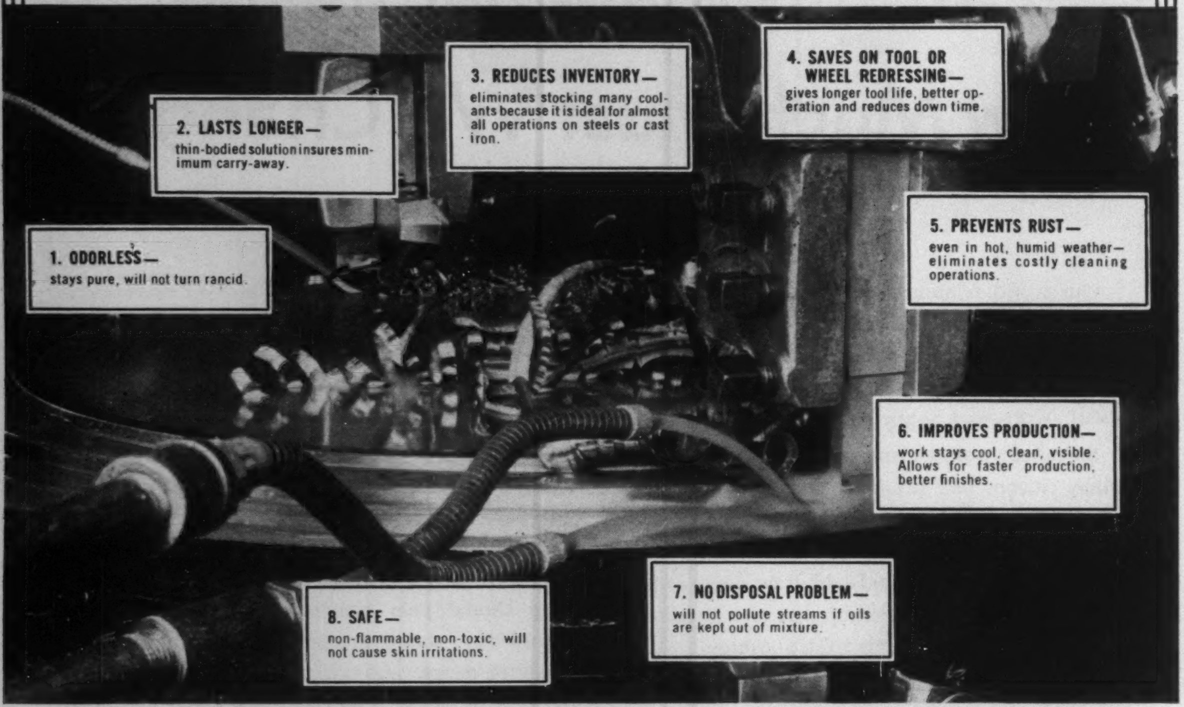
But it does mean that when our leaders take the money earned by our citizens, it should be handled as a trust is handled. It should not be spread around as if it came from a bottomless well. If we do this and at the same time stop being so sensitive because people may not like us, we will be on our way to more respect and better national health. And we will be better equipped to be world leaders.

In short, our next president should continue to help us grow up.

Tom Campbell

Editor-in-Chief

USE ONE COOLANT TO SAVE 8 WAYS!



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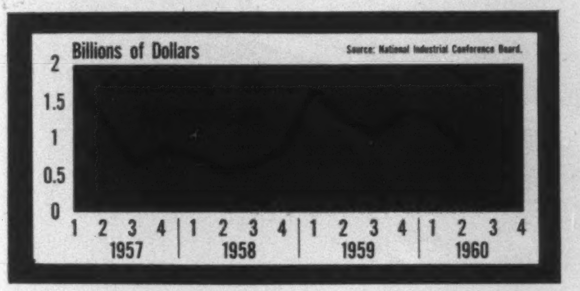
Capital Goods Orders Drop

A decline in capital goods orders can be expected at the end of this year and into 1961. This is the conclusion of the latest IRON AGE survey of metalworking capital appropriations (see p. 69).



Source: National Industrial Conference Board.

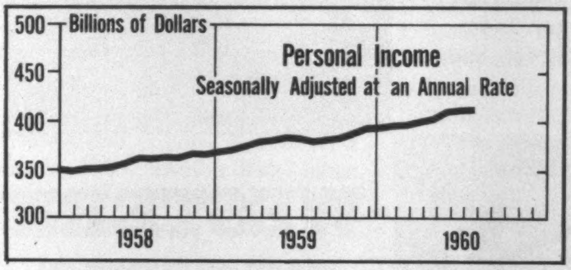
New appropriations for plants and equipment in the second quarter dropped 31 pct from the second quarter. Taking the traditional 6 to 12 months lag between appropriations and actual orders, this places the decline at the end of this year.

What Inventory Figures Don't Show

Inventory liquidation has been much greater than government figures indicate. Broad statistics show dollar volume of inventories is just starting to drop. But these reports do not show the shift from raw material stocks to finished products. One significant point: It reflects the fact that most companies can get fast delivery, and also must give fast service.

Income Rises, Despite Slowdowns

In spite of the summer slowdown, and current recession talk, personal income continues to climb. In August, a rise in government civil service pay counterbalanced decline in farm income and manufacturing payrolls. As a result, personal income hit $407.6 billion (seasonally adjusted annual rate).



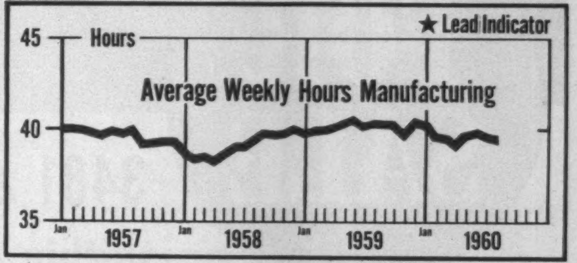
This figure is up $300,000 from July. With a somewhat better manufacturing outlook in September, there is no reason to predict a decline this month.

What's the Current Cycle?

Most asked question at a recent NICB marketing session: What is the present state and future direction of the cycle. Most frequent answer: "A recessional slide, to continue for three to six more months. The recession should be of less intensity than the one in 1957-58." Some hold out for a "sideways" motion in the general economy.

Manufacturing Workweek Holds

Crosscurrents of employment nullified each other in August. As a result, the factory work week stayed at 39.7 hours. Usually, Dept. of Labor economists point out, the workweek rises in August. Here again, seasonal gains in some industries offset declines in steel, automotive and auto supplier plants.



Machine Tool Orders Should Rise

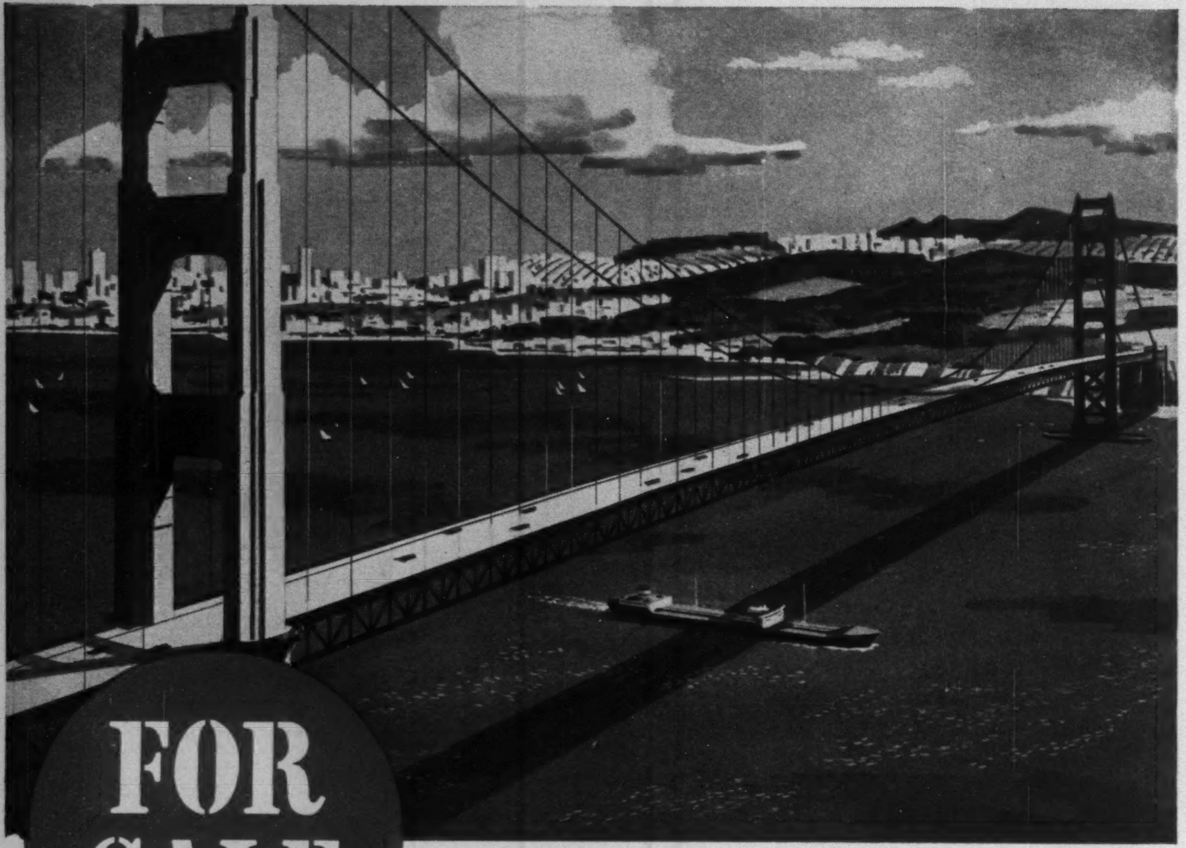
A variation on the downtrend in capital spending may come in the machine tool industry. This will be the direct result of the Machine Tool Exposition. Some sources predict as high as a 50 pct rise in tool orders on the basis of interest in new developments.

Many prospective buyers had taken a "wait-and-see" attitude in advance of the show, when most builders offered new tools, new control systems, and special features.

Industrial Production Drops

Industrial production declined in August and a further decline is likely in September. The FRB Index of Industrial Production dropped to 109, on a seasonally adjusted basis, down from 110 in July.

The July rate of 110 pct of the 1957 average, represents a full one point upward revision. First reports put it at 109. The question now is whether September will show more than a seasonal rise.



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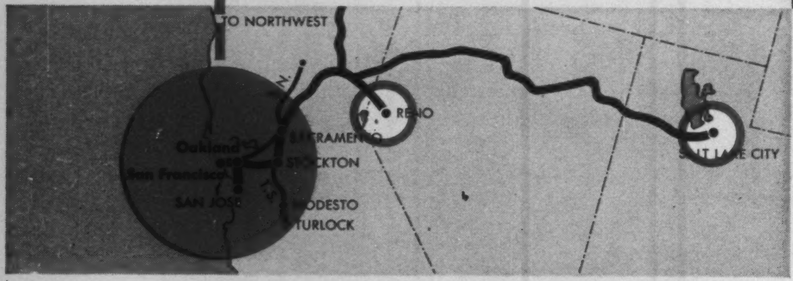
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USWA: Short Week The Next Big Issue

The United Steelworkers have now focused efforts on the problem of unemployment and union membership.

This is the conclusion drawn from pre-convention remarks of union president David J. McDonald as the USWA convention opened in Atlantic City this week.

Mr. McDonald contends that 150,000 USWA members are out of work and 350,000 on less than full time. As a result, the union is gearing up its drive for a short week.

Mr. McDonald warns that "because nobody else is doing anything about unemployment," the union will go for a 32-hour week. And because it can't negotiate before 1961, it will take its drive to Congress.

Other USWA convention atmosphere sidelights:

The endorsement - of - Kennedy resolution was well in hand; it was disclosed that Vice President Nixon was not invited to address the convention.

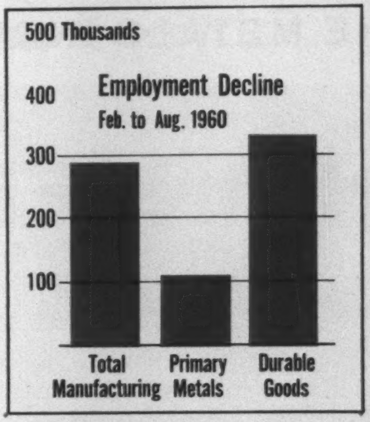
The human relations sub-committees are at work and the full committee at Kaiser Steel will meet after the convention.

More important is the unconcealed fact that the committee on work rules is getting nowhere; with the union and the industry unable even to agree on a neutral member.

Unless this attitude changes, work rules as an issue will be unmodified and as bitter in 1961 as it was in 1959, when a long, bitter strike and injunction period failed to settle anything.

Durables, Metals Pace Rise in Unemployment

Employment in heavy industry is showing the effects of the current business sag. (See chart). Between February and August the number of workers employed by the primary metals industry dropped 124,000 seasonally adjusted. The loss for durable goods manufacturing was 329,000, while total manufacturing was down 293,000.



In contrast, payrolls in non-durable goods industries rose in the same period. The gain was 36,000.

Total non-farm employment increased by 165,000 in August to a total of 53.4 million workers. But, Labor Dept. reports describe the rise as "not as large as usual for this time of year."

Employer Quits

One strike-embattled Cleveland metalworking firm has decided to liquidate rather than give in to union demands. Thirty-six employees, members of the USWA, who have been on strike since Sept. 1 with Newart Manufacturing Co., will look for other jobs.

Milton E. Kaden, plant superintendent, said machinery will be turned over to a liquidator or sold piecemeal, and the state Bureau of Unemployment Compensation notified of the closing. The firm had been manufacturing electric outlets and switchboxes.

More Arbitration Coming

"Watch for a flood of grievances. . . ."

This is the warning a prominent labor attorney makes following a series of three Supreme Court rulings. Partner in the law firm of Reed, Smith, Shaw & McClay, and a top authority on labor relations, Nickolas Unkovic feels the rulings have put negotiated contracts up for challenge and paved the way for more arbitration.

The Supreme Court, he says, has asserted these new principles:

1. Management retains only those rights which are specifically excluded from the labor agreement.

2. Even though a union has failed to get certain concessions in past negotiations, it may use the arbitration process to try again.

3. Labor arbitration is outside the general rules of law.

In addition, says Mr. Unkovic, the court has directed arbitration of a grievance that is "frivolous and patently baseless;" it has said arbitrators should weigh things like morale, tensions, and other items outside the contract.

The new doctrine stems from three decisions handed down June 20, all involving the Steelworkers. In all cases, the union sought to compel the companies to submit disputes to arbitration.

Mr. Unkovic's conviction: The cases will unstabilize labor relations rather than settle them.

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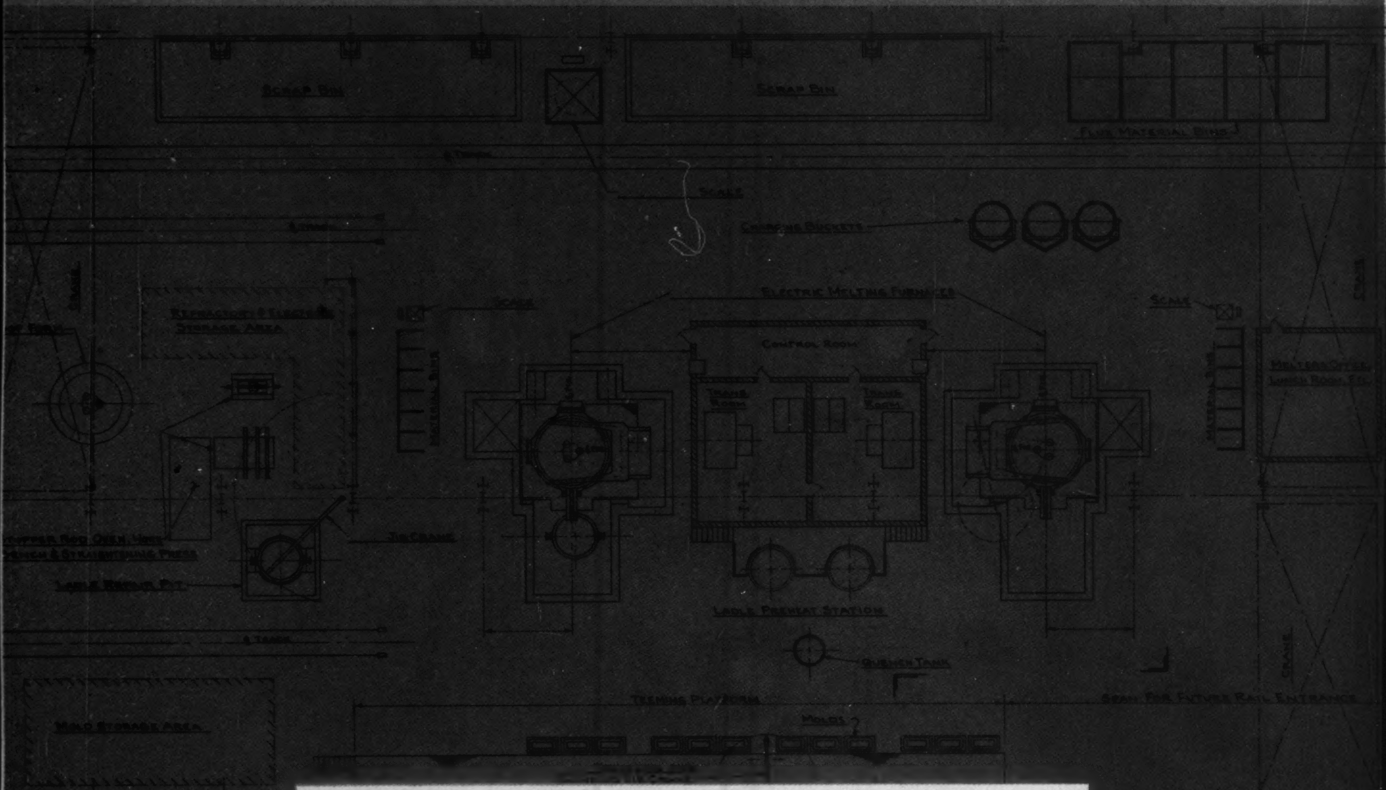
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SCRAP BIN
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MATERIAL BINS
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TRANS. ROOM
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By R. W. Crosby

★Should FTC Open Records?

If the Federal Trade Commission has its way, businessmen's confidential reports to the U. S. Census Bureau could be used against them in antitrust prosecution cases by the government.

The FTC is appealing to the U. S. Supreme Court hoping to win the right to use information on the secret census forms against the companies which file them. The high court will take up the matter next month.

The issue has created an unusual family fight within the government. Census Bureau officials and the powerful Budget Bureau are fighting the move. Antitrust officials at the Justice Dept. are supporting the FTC.

If the FTC and antitrusters get their way they will have access to census reports filed by every interstate corporation in the U. S. And they will use the information in the reports to prosecute anti-merger cases. The reports contain information on the share of the market held by corporations.

In Secret Files—The census takers argue that the reports are complete only because they are confidential. They say removing them from the secret files would hurt business census programs.

Antitrust officials contend that Congress never intended the financial figures to be secret. They back up their contention by pointing out that similarly confidential income tax records may be used in government probes.

However, this happens only under extreme circumstances, and so far, the courts have backed up the Census Bureau opinion.

■ The Budget: Ike Versus Congress

Congress this year provided President Eisenhower with $73.6 billion in cash appropriations. The total was $211 million less than he sought.

But the comparison is misleading since it conceals two main developments in Congress' struggle with the President over budgetary matters this session:

(1) Congress, despite the reduction in cash appropriations, wound up boosting federal spending for the year. It more than offset reductions in appropriations by boosting outlays budgeted for programs financed through the treasury "backdoor." "Backdoor" spending is authorization from Congress to make expenditures by borrowing from the U. S. Treasury.

(2) In its appropriations of direct cash, Congress slashed some programs dear to the President's heart, such as foreign aid. But it gave him a total of about $1 billion more than he wanted for the Departments of Defense and Health, Education and Welfare.

■ GOP Could Gain Congressional Seats

Political analysts say Democrats might lose seats in both the House and the Senate this year. However, it is improbable that Republicans will take control of Congress.

There are 65 Democrats, 34 Republicans, and one vacancy in the Senate. Up for re-election are 23 Democrats and 11 Republicans. Present political predictions are that Democrats could lose as many as five seats.

The House has 280 Democrats, 151 Republicans, and six vacancies. All the seats are at stake this November. Forecasters say as many as 200 seats could change parties, with the Republicans most likely to gain.

■ Neglected Support

Pentagon scientific advisors say ground support equipment for U. S. missiles and space vehicles is not getting enough attention from the Defense Dept.

The Corps of Engineers chief science advisor, Gilford G. Quarles, says because ground support equipment does not have the glamour of huge boosters, satellites, or space vehicles, it "oftentimes does not receive adequate recognition from top-level planners or even the systems engineers."

TITAN: Base building.

As Mr. Quarles points out, for any succesful missile or space shot, support equipment is essential.

■ ICC to Study Rates

The Interstate Commerce Commission holds a hearing Oct. 18 to determine whether to permit virtually all major railroads to increase freight rates.

Higher rates would raise shipping costs an average of 1 pct.

The railroads have announced that they intend to make the freight charge increases as of Oct. 24.

90 STANDARD SIZES

in a Custom-Quality Press

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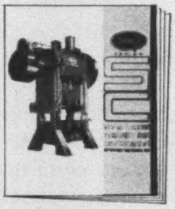
at the Machine Tool Exposition,
Booth No. 1250.

Take your choice of dependable Danly SC crankshaft presses in capacities from 50 to 300 tons...bed areas to 72″ x 60″...with strokes to 16″...constant or variable speeds to 90 SPM...with non-geared, single or double-geared drives...equipped for manual or automatic feed.

Every SC press gives you Danly's patented low-maintenance air-friction clutch, husky welded-steel frame, and countless other custom-quality features.

For low-cost piece part production ...in blanking, drawing, piercing, forming, or progressive die stamping... you'll find your choice of Danly SC Presses ahead of the field and best for you. WRITE FOR NEW SC CATALOG and get all the details.



DANLY

DANLY MACHINE SPECIALTIES, INC., 2100 S. LARAMIE AVE., CHICAGO 50, ILLINOIS

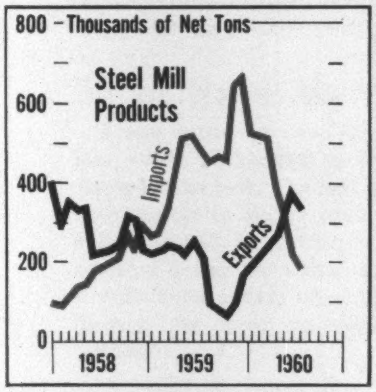
Steel Export Rise Comes to Halt

International steel trade appears to be leveling off as both exports and imports dropped during July.

During the month, exports fell to 331,000 tons, 51,000 tons less than in June, according to Dept. of Commerce reports. Imports totaled 177,000 tons, 36,000 tons less than came into the country in June.

The July export figure, however, is still well above the June, 1959 total of 176,000 tons. July shipments last year were already showing effects of the steel strike.

The July tonnage ended the climb of export tonnage that had continued for the eight preceding months. The import decline has been steady for the past five months.



Imports are still ahead of exports for 1960. Imports for the first seven months reached 2,797,000 tons, while exports totaled 2,393,000, but the gap is narrowing.

Hope for Better S. A. Relations

U. S. relations with South America are scheduled for improvement following the recent Bogota talks.

The U. S. will get started with its $500 million-plus plan to help South American nations. A great share of the credit for this goes to Douglas Dillon, Undersecretary of State, who is laboring to relieve tensions between those nations and this country.

One of the major problems of gaining success in the past has been the hurried attitude of American diplomats. Their practice of coming late and leaving early from Latin American conclaves have been highly resented by the Latins. The word is out that this practice will come to an end.

Allis-Chalmers Expands Foreign Holdings

Allis-Chalmers has expanded its international operations with the purchase of a French company making air-cooled diesel farm tractors, industrial engines, and engine-generator sets.

The French company, Etablissements de Constructions Mecaniques de Vendeuvre, S. A., will continue to produce its current line of equipment and distribute through its own sales organization in France. Products will be sold to other parts of the world through Allis-Chamlers International.

Headquartered in Paris, the company employs 1000 workers and has two plants, one at Dieppe and the other at Vendeuvre.

Two U. S. Companies Sign Foreign Pacts

The trend toward more international machine tool tie-ins is growing fast.

In recent dealings Pratt & Whitney Co., Inc., announced it will distribute a line of milling, boring and combined machines built in Italy and Japan. Other companies in the triple arrangement are Innocenti, S. G., Milan; and Mitsubishi Shipbuilding & Engineering Co., Ltd, Tokyo.

Pratt & Whitney will sell small machines made by Mitsubishi in Japan under licensing from Innocenti, and large boring mills made in Milan by the Italian company.

The Metal Processing Machine Co., Youngstown, has been licensed to manufacture, sell and service a new shear developed by Corpet Louvet et Cie., Paris. The machine is designed to square shear and bevel shear plate steel or other metal. The shear is basically a standard hydraulic shear with the square beveling knives on one pivoting ram.

The McKay Machine Co., parent company for Metal Processing, already has two existing agreements with companies in Great Britian and France.

Foreign Ore Imports Hurt Domestic Mines

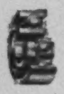
Steelmakers are continuing to move more foreign ore than domestic lake ore even though steel production has been off for several months.

Hardest hit in this trend are the Lake Superior mines whose shipments were cut back as long ago as late June.

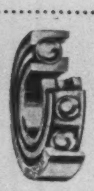
Reasoning behind the continuing foreign ore movement from Canada and South America is to realize on investments U. S. Steel companies have made in developing ore deposits in those areas.

The slowdown in Lake Superior ore shipping has affected employments, carloadings and local business conditions.

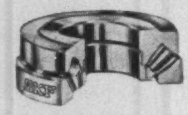
Some experts feel this trend will continue until taconite production reaches peak levels a few years from now. After that, Lake ore shipments may be stabilized at about 45pct of total ores received by U. S. steel companies.



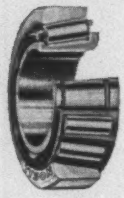
REED Instrument Bearing



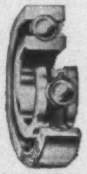
Angular Contact Bearing



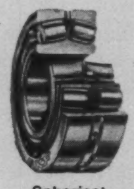
Spherical Roller Thrust Bearing



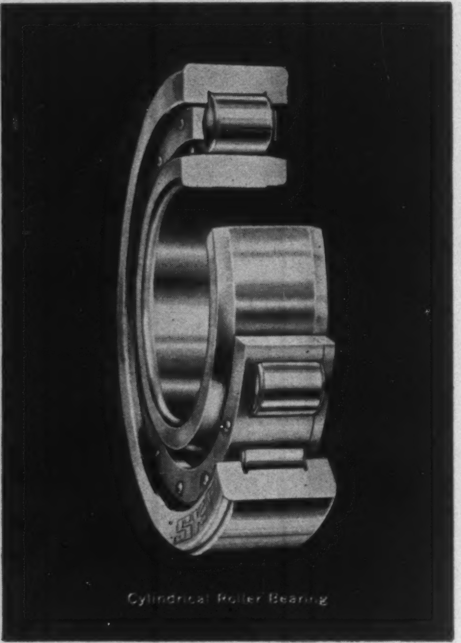
Tapered Roller Bearing



Single Row Deep Groove Ball Bearing



Spherical Roller Bearing



Cylindrical Roller Bearing

What's a "special size" in production bearings?

SKF makes so many standard sizes, there's practically no such thing as a "special size" of bearing. They range from tiny instrument bearings right up to four-row tapered roller bearings—and account for almost every possible bore size in-between.

Take SKF's standard cylindrical roller bearing, for example. It's promptly available in 154 sizes of single- and double-row types—for shaft diameters ranging from 1" to 9.5". Every size, in both types, offers high radial capacity in relation to its size and operates at highest speeds because of its very low friction.

So, before you specify a "special size" bearing, call the nearest SKF sales office first. The odds are better than 1,000 to 1 that there's already a standard SKF bearing of exactly the size you need. 6007

Spherical, Cylindrical, Ball, Tyson Tapered and REED Miniature Bearings

EVERY TYPE—EVERY USE

SKF®

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

Preserves And Color Codes

With increased emphasis on outside storage of finished goods, corrosion preventive manufacturers will be offering three new types of rustproof coatings. All are based on a water emulsion to cut fire hazards. The coatings can be brushed, dipped or sprayed in various color codes to identify the manufacturing lot number or age of goods stored outside the plant.

Creep-Rupture Behavior

A new device aids metallurgists in studying the creep-rupture behavior of alloys near their melting temperatures. Using a master diagram, developed by the Union Carbide Metals Co., and any three of the four main design variables, the fourth variable can be quickly determined. The four variables include: stress, temperature, material, and rupture time or creep rate.

Slices Rare Metals

A new cut-off machine slices rare metal ingots into wafers so thin that up to a hundred can be stacked to an inch. The unit embodies an entirely new concept in slicing friable materials. It uses a 0.006-0.010 in. cutting wheel with an open center. Circling the inside opening of the wheel is a diamond cutting edge. Ingots are positioned through the inner opening and sliced automatically.

Casts Four Times as Fast

A major copper company developed a new machine for continuous casting of copper billets. The unit casts three billets simultaneously, at a speed of 55 ipm. The machine is similar in appearance and design to others used in the industry. However, it differs primarily in some key innovations which make it four times as fast as machines now in operation.

Profits in Diamond Dust

Collecting diamond dust in the machine shop can be a profitable undertaking. A new diamond collector recovers the swarf or diamond-bearing dust directly from the grinding wheels. The valuable swarf is sold to specialists who reclaim it for further usage. The collector operates on a centrifugal separating principle. It deposits the dust in a plastic container for visual inspection.

New Controls for Job Lots

Watch for a new tape-controlled machine tool which combines three separate work heads to form a "maching center" around a central work table. Its developer, Hughes Aircraft Co., says it is an exceptionally versatile approach to automating job-lot production of parts. The entire system is designed on a building-block principle, and may be had with optional work heads to meet individual job needs.

Checks Furnace Top-Gases

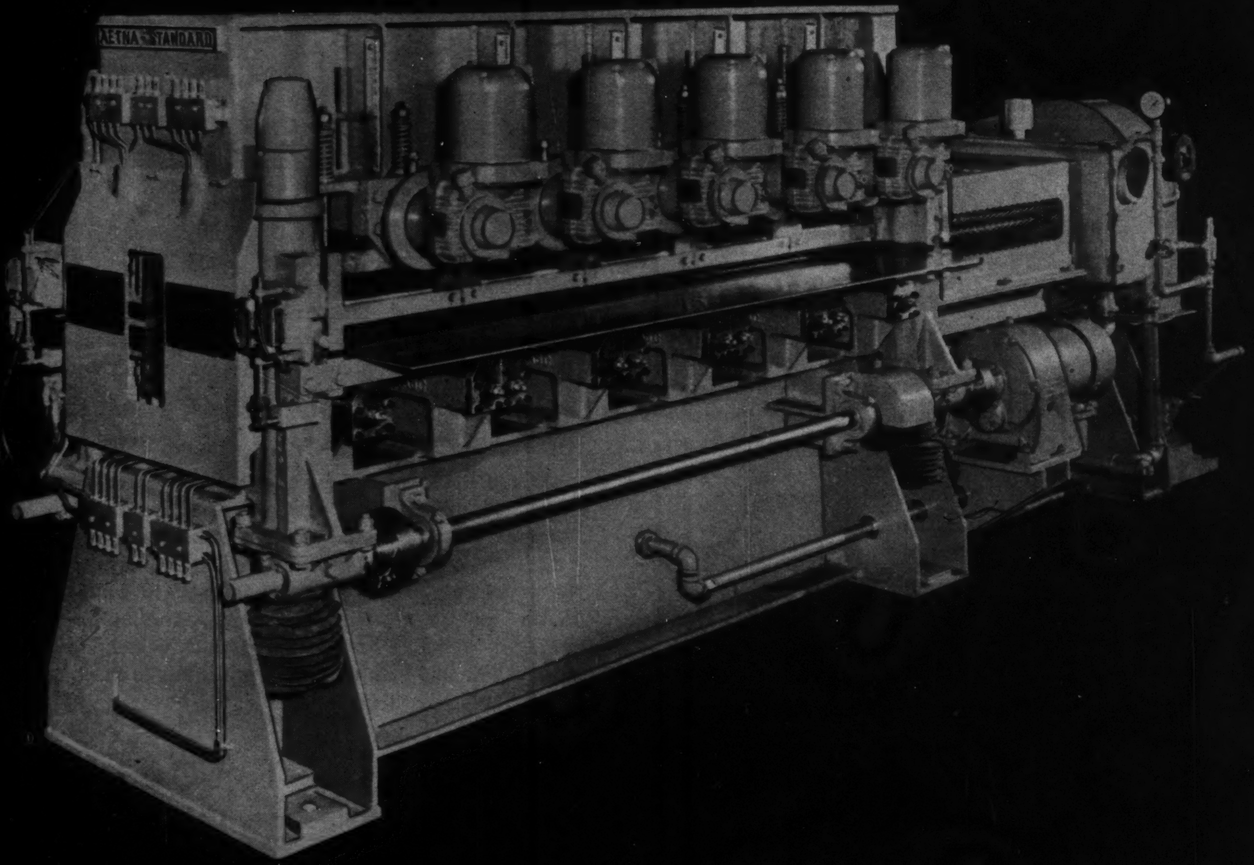
A self-contained analyzer system simultaneously measures and records blast furnace top-gases CO, CO_2, and H_2. This new Leeds & Northrup assembly accurately detects and records changes in furnace top-gases within 45 seconds from the time they occur. All measuring cells are housed in a single thermostated cabinet. The system uses thermal conductivity and infra-red absorption methods to measure gases. Measuring cells have no moving parts and require no replacement of chemicals or other sensitizing elements.

Paste Removes Oxides

A paste compound is being formulated which will remove surface oxides from metals. It's particularly aimed at removing the heat tint resulting on stainless steel when it is welded or otherwise overheated. Unlike pickling solutions, the paste can be flushed directly into sewers. Being a paste, it can be applied to a surface in any position.

Engine Burns Many Fuels

To meet recent demands, a major engine producer is coming up with a poly-fuel diesel. The new V-8 engine will burn L-P gas, diesel fuel, gasoline or natural gas and will offer up to 400 hp in all fuel-burning categories. It will be offered in two models, with a total weight to 1750 lb.



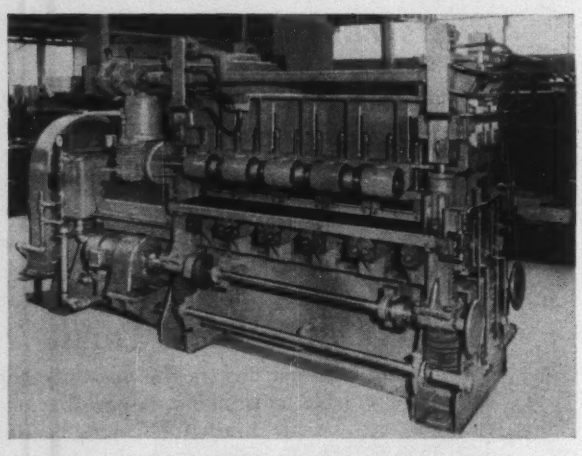
MORE WORK ON PRODUCT MADE POSSIBLE
WITH THIS

NEW ROLLER LEVELER

This new Roller Leveler, designed and manufactured by the Aetna-Standard Division of Blaw-Knox, has individual motor-operated back-up roll adjustments. The operator can easily make quick correction of product shape. The additional sets of back-up rolls make possible more flexibility of adjustment and more thorough working of the product. Motorized adjustments are also included for gauge thickness which make the unit fully equipped with power adjustments.

Leveler illustrated is 1¾″ dia. x 72″ face—21 rolls. Other sizes can be furnished to suit individual requirements. For detailed information on this new Roller Leveler or other Sheet and Strip Equipment, write: Aetna-Standard Division, Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

AETNA-STANDARD MAKES MANY TYPES OF LEVELERS
These include 2 and 4 high Roller Levelers, Rectifier Levelers, Heavy Plate Levelers, Roller Levelers for tapered sheets.



Aetna-Standard Division
BLAW-KNOX

LETTERS FROM READERS

For Defense

Sir—We are engaged in preparing the manuscript material for a work to be published for defense purposes, under the title, "That Old Problem: Inventory," in the Alaskan Air Command Bulletin. We request permission to include portions of "Inventory Controls: Just How Good Are They?" from your July 21, 1960 issue. We wish to quote the title of your article as our concluding senfence. We would appreciate it if this material, with an appropriate credit line, may be used.—Edwin L. Little, Colonel, USAF, Alaskan Air Command.

■ **Permission is granted.—Ed.**

Wrong?

Sir—Take a look at the photograph on p. 19 of your September 1 issue. The gentleman pictured therein is alleged to be bringing "music from the stalactites in the Caverns of Luray, Va." I fail to see any stalactites in the picture, but I do see several stalagmites. How come? — George S. Rose, American Iron and Steel Institute, New York, N. Y.

■ **We stand our ground. There are stalactites in the upper left portion of the picture and even more in the part of the photograph not used in the engraving. Also, according to "Webster's Unabridged Dictionary" a stalactite "(deposited from ceiling down) and a stalagmite (formed from floor up) often join in a single, complete column."—Ed.**

Student Research

Sir—I am a student at the Polytechnic Institute of Brooklyn in the department of Metallurgical Engineering. My thesis project contains work in the field of porosity measurement. I have just finished reading the article "New Test Checks for Electroplating Porosity," which appeared in The IRON AGE, March 7, 1957. I would appreciate it, if reprints are still available, if I could be sent one.—Paul Weinstein, Brooklyn, N. Y.

■ **The reprint has been sent.—Ed.**

Ideal Material

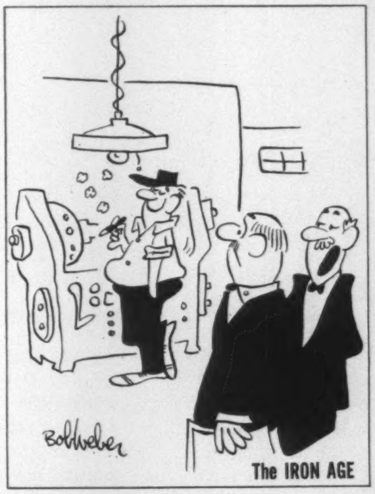
Sir—I enjoyed your very informative article entitled "How to Choose Arcwelding Electrodes." Articles such as these make ideal lecture material for welding courses. If reprints are still available, I would appreciate having a copy.—W. N. Bruce, Northern Electric Co., Lachine, Que., Canada.

■ **The copy is enroute.—Ed.**

Supply Source

Sir—We have been referred to you as a source of supply for a Directory of Ferrous and Nonferrous specifications. If you can supply us with this, it would be very much appreciated.—Jean P. Hollis, Worth Products Co., Port Huron.

■ **The two packets are on the way. —Ed.**



"He tried the same thing on me. There's no such thing as a 'Be Kind to Machinists Week.' "

NEW BULLETIN

Tells How Contract Manufacturing Saves You Time and Money

Taft-Peirce provides an unusual range of creative engineering and manufacturing services for American industry. Complete facilities under one roof to help you . . .

- **Design a better product or mechanized process.**
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- **Manufacture parts or complete assemblies.**
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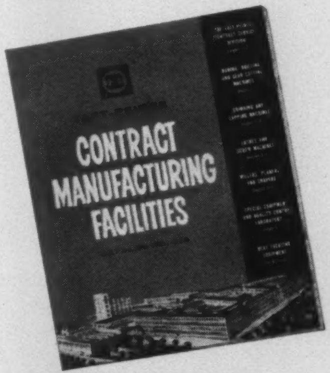


TAKE IT TO

TPO-9

TAFT-PEIRCE T P

29 Mechanic Avenue, Woonsocket, R. I.

CARS

STEEL is an automobile, modern sculpture in motion. About 3600 pounds of sturdy steel make today's American car the safest, most useful family vehicle in the world. And the most beautiful. For stylish steel is the designers' metal. It can be drawn, formed, finely shaped—and it gains in strength as you work it. Youngstown makes quality carbon, alloy and Yoloy, (and soon to be announced) galvanized steel sheet and strip to exacting standards that have made Youngstown a growing force in steel.

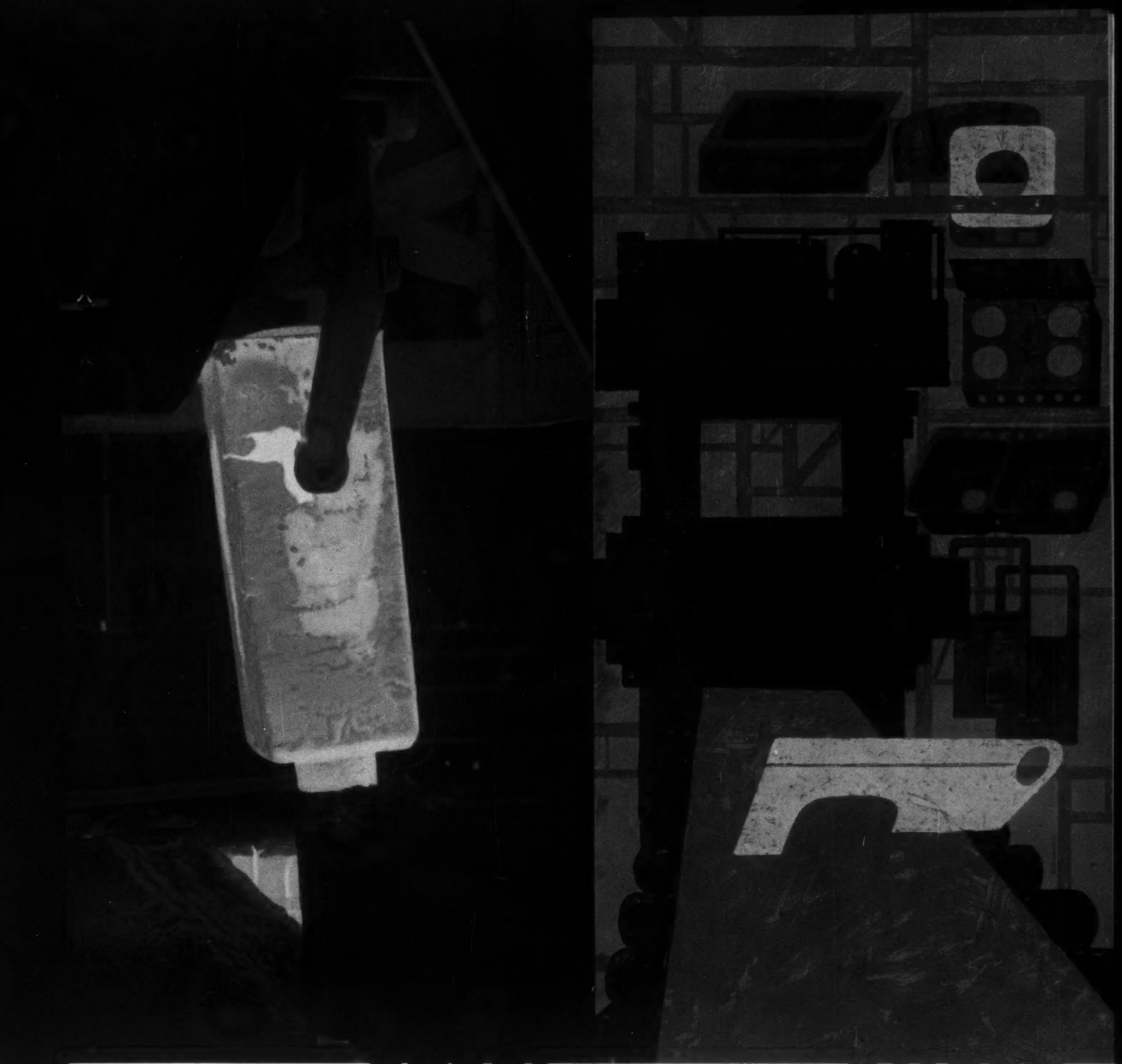
CANS

STEEL is a container, thinly coated with tin—the practical tin can. No other container guards a product so well, and delivers throw-away convenience at such low cost. Youngstown is a leading supplier of quality tin plate. The addition of the world's only six-stand tandem cold reducing mill to Youngstown's Indiana Harbor No. 2 Tin Mill will yield thinner, more accurate gauges to serve you even better. For your growing tin plate needs, you can depend on Youngstown, a growing force in steel.

Youngstown –

THE YOUNGSTOWN SHEET AND TUBE COMPANY, YOUNGSTOWN, OHIO.

ATLANTA BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND COLUMBUS DALLAS DENVER DES MOINES DETROIT



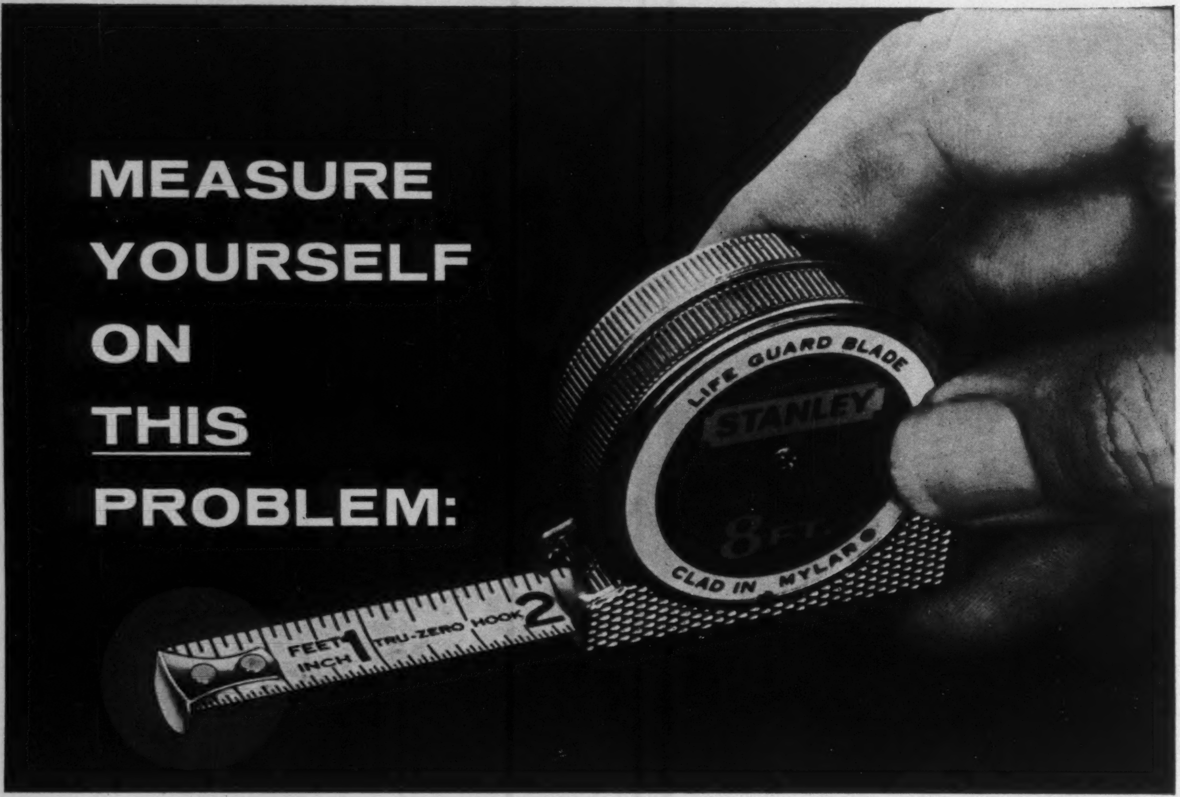
STEEL SHEET

STEEL sheet is a way to make things. Toys, locomotives, cars and cans. Dishwashers and curtain-wall buildings. In Youngstown, modernization and expansion on the 79-inch hot rolling mill will mean you can get coils up to 50,000 pounds for faster, more efficient handling. Coils with fewer welds to help you turn out better products at lower cost to successfully meet competition at home and abroad. Modernization and expansion to serve you better will keep dynamic Youngstown a growing force in steel.

YOUNGSTOWN STEEL sheet is tested and retested for quality. It is decoiled, inspected, oiled and coiled again in extra steps after tempering, to deliver smoother, finer sheet. Get it hot rolled or cold reduced, in the temper and gauge you want. In precision cut lengths as well as coils. And in the finish you want. You can get it through 28 Youngstown Offices or from your steel service center. When you want quality product and dependable service, call on modern Youngstown, a growing force in steel.

growing force in steel

GRAND RAPIDS HOUSTON INDIANAPOLIS KANSAS CITY LOS ANGELES MILWAUKEE MINNEAPOLIS NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS SAN FRANCISCO SEATTLE TULSA WASHINGTON



"Make it slide exactly 0.025 inch . . . hold it securely . . . do it at lowest cost"

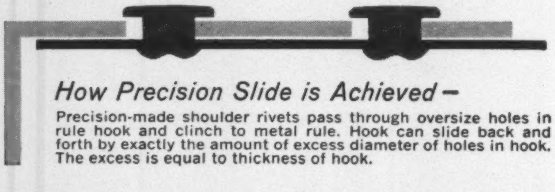
Stanley got the answer from a TRS man

The hook on the end of a steel tape rule must slide back and forth, exactly enough to offset the thickness of the hook when taking outside or inside measurements. The problem faced by Stanley Tools of New Britain was to put the sliding action in the hook, without making profits slide.

How to avoid the high cost of attaching the hook with screw machine fasteners was the question put to a TRS Engineer, trained in the PAR Process approach to assembly work. His answer saved 31% on fasteners and 8% on per-unit assembly time.

He demonstrated that the precision of standard TRS nickel-plated steel shoulder rivets would fully satisfy the needs of the job. Also, that the two rivets could be automatically fed and set in one operation by a standard TRS double-drive riveter.

Foreign rivets flopped on this job. Stanley was quick to pass the new cost-cutting trick on to their English plant. They shipped a duplicate TRS riveter over and tried foreign-made rivets, but without success. Now, TRS rivets are used in the English operation. TRS has the equipment, skill and quality control to assure reliable precision.



How Precision Slide is Achieved—

Precision-made shoulder rivets pass through oversize holes in rule hook and clinch to metal rule. Hook can slide back and forth by exactly the amount of excess diameter of holes in hook. The excess is equal to thickness of hook.

When you call in a TRS Engineer, you get rivets that save you the high cost of trouble and rejects. And, you get the benefit of an uncommon ability to come up with cost-reducing answers . . . the PAR Process way of simplifying and making assembly more automatic.

Don't Buy Riveting Machines until you learn how the TRS **PAR** *process revolutionizes riveting*

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See "Yellow Pages" for phone numbers.

If it's a Tubular Rivet TRS makes it . . . and Better

FATIGUE CRACKS

The Story Behind Capital Spending

When you think of the money involved, it may seem incongruous to compare industry's plans for buying capital goods with your personal purchases of automobiles, washing machines, TV sets and refrigerators.

But unless you're really loaded, both kinds of purchases have one thing in common. They take a lot of advance planning.

The kind of information which tips off sellers to what buyers have in mind is what some economists call "anticipatory data." Other economists use the term "expectational data." Others, more simply, talk in terms of buying intentions.

The Beginning—One of the first surveys of **consumer product** buying intentions was developed by the Survey Research Center of the University of Michigan shortly after World War II.

By periodic and extensive sampling of attitudes, the well-known Michigan survey reports people's plans for buying cars and major household goods in the months ahead.

Good Results — The results of these surveys have proven surprisingly accurate and now are widely used to forecast consumer product demand.

In like manner, the **intentions of business to spend** are revealed in the continuing survey of metalworking capital appropriations conducted for The IRON AGE by the National Industrial Conference Board. The latest survey report in the series begins on p. 69 this week.

In many ways, metalworking capital appropriations are a more stable indicator of **future plant and equipment spending** than surveys of consumer buying intentions.

The Process — For one thing, management does not suddenly decide to put up a new plant, add a heat-treating line or expand its machining facilities overnight.

Usually these spending decisions are made after recommendations from all levels of a company and careful review by top management. Appropriations are not guesses, opinions or hazy estimates. They represent management's basic decisions to spend money for capital goods at some time in the future.

In metalworking capital appropriations run ahead of actual spending anywhere from six months to a year. And unlike the buying of appliances and television sets, capital spending decisions cannot be made at breakfast and reversed at dinner.

So, if you're interested in what metalworking intends to spend for capital goods through the first quarter of next year check this week's report.

Short, Happy Sentence

Seven salesmen spent three days in "jail" and wound up being very happy about it.

Knodel-Tygrett Co., Cincinnati, distributors of Norge and Zenith products, costumed seven of its salesmen in convict clothes and locked them in the company offices. Their sentence: To remain there until 85 pct of their customers visited their "cellblock."

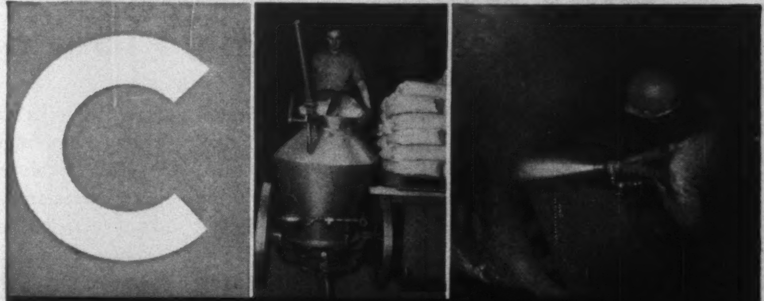
Good Behavior — The seven "convicts" stayed in the lockup for a little over three days. By that time their quota of visitors was reached and they were "pardoned." And as the customers started through the gates to visit the "inmates" they were shown new range and laundry appliances and current merchandising and promotions.

Says the company's vice president, James Tygrett, the promotion created a great deal of attention among dealers and the business community and got fall business off to a very good start. "In sales we were able to sell as many units as we normally do in a six day period."

The second day of the imprisonment of the salesmen set a new sales record for the company.

Save TIME and MONEY in building, repairing, waterproofing concrete construction with the

CEMENT GUN® and its sand-cement product GUNITE®



BUILDING CONSTRUCTION • REPAIRS TO CONCRETE • DOMES • MINES • CANALS • PIPELINES • SEWERS • PRESSURE GROUTING • REFRACTORY PLACING • RESERVOIRS • TANKS • STACKS AND BUNKERS • STEEL ENCASEMENT • SWIMMING POOLS

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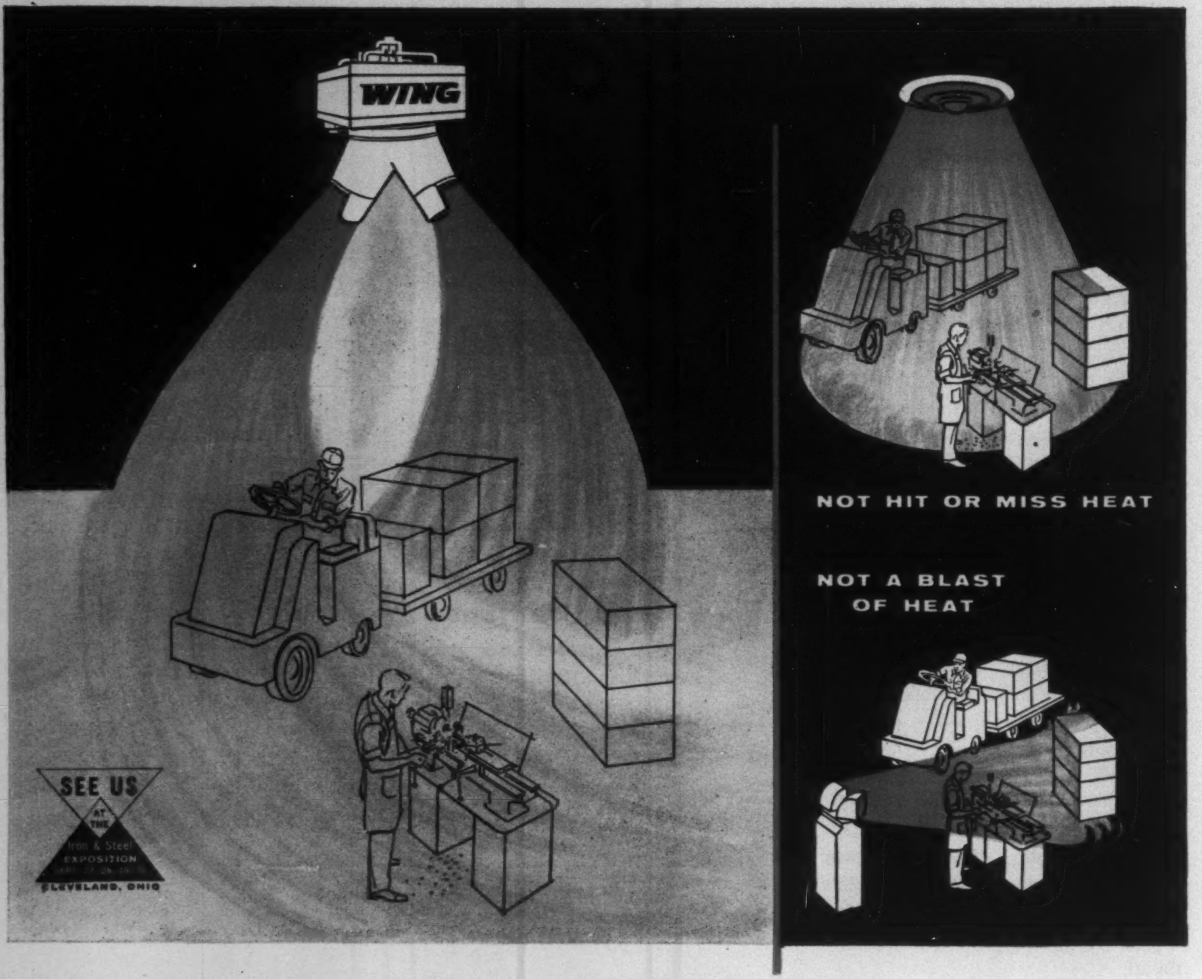
write or phone for estimates or information



Only Wing Revolving Heaters Provide a Sweeping Flow of Perfect Heat

The unique slowly revolving discharge of Wing Heaters blankets the heating area—and does it more economically—than other heating units. With Wing Heaters, you can be sure that warm air is spread over the entire working area—throughout the occupancy zone, behind and around obstructions and into corners. There are no cold areas or torrid blasts as with other heater designs. Result? Workers are more comfortable and more productive.

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Wing Revolving Heaters have proved their outstanding performance in thousands of installations over many years of service life. They are easy to install, simple to maintain—and are available for steam, hot water or gas. Four types of revolving discharges are available to suit your requirements.

Write today for complete information telling how Wing Revolving Heaters can give you lowered costs and reliable operation.

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FACTORIES: LINDEN, N. J. AND MONTREAL, CANADA
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WING

COMING EXHIBITS

Iron & Steel Show—Sept. 27-30, Cleveland Public Auditorium, Cleveland, O. (Association of Iron & Steel Engineers, 1010 Empire Bldg., Pittsburgh 22.)

Metal Show— Oct. 17-21, Convention Hall, Philadelphia. (American Society for Metals, Metals Park, Novelty, O.)

Die Casting Exposition & Congress—Nov. 8-11, Detroit Artillery Armory, Detroit. (The Society of Die Casting Engineers, 19382 James Couzens Highway, Detroit 35.)

MEETINGS

SEPTEMBER

Porcelain Enamel Institute, Inc.—Annual meeting, Sept. 25-28, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 1145 19th St., N. W., Washington, D. C.

Farm Equipment Institute—Annual convention, Sept. 25-28, The Statler Hilton Hotel, Dallas, Tex. Institute headquarters, 608 S. Dearborn St., Chicago.

American Welding Society — Fall meeting, Sept. 26-30, Pittsburgh. Society headquarters, 33 West 39th St., New York.

OCTOBER

Metal Lath Mfrs. Assn.—Fall meeting Oct. 6-7, The Greenbrier, White Sulphur Springs, W. Va. Association headquarters, Engineers Bldg., Cleveland.

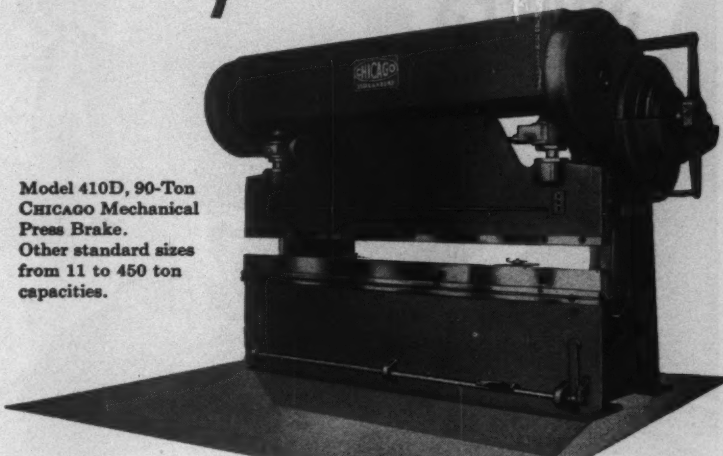
The Electrochemical Society, Inc.—Fall national meeting, Oct. 9-13, Shamrock Hotel, Houston, Tex. Society headquarters 1860 Broadway, New York.

American Gas Assn.—Annual convention, Oct. 10-12, Atlantic City. Association headquarters, 420 Lexington Ave., New York.

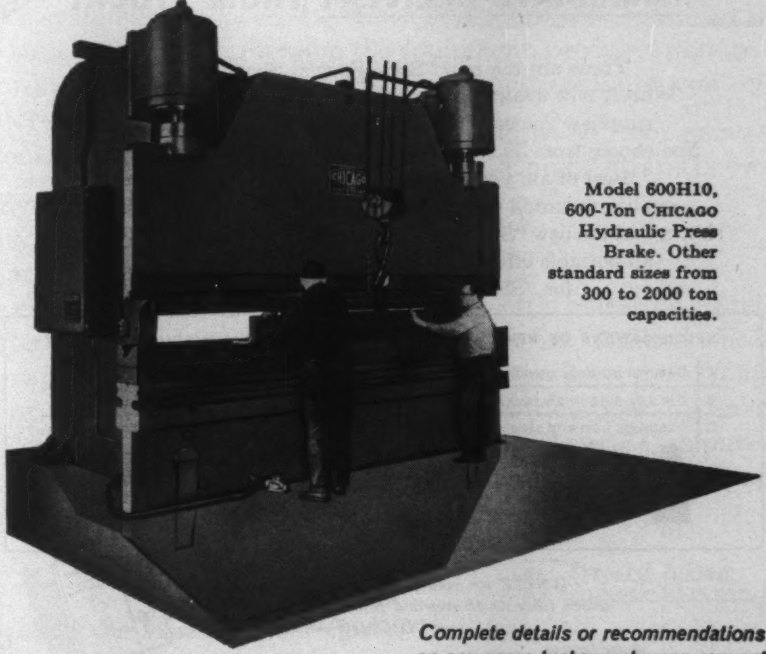
Pressed Metal Institute — Annual meeting, Oct. 10-14, Shawnee Inn, Shawnee-On-Delaware, Pa. Institute headquarters, 3673 Lee Rd., Cleveland.

CHICAGO® PRESS BRAKES

unexcelled accuracy / ***for sheet metal and plate work***



Model 410D, 90-Ton CHICAGO Mechanical Press Brake. Other standard sizes from 11 to 450 ton capacities.



Model 600H10, 600-Ton CHICAGO Hydraulic Press Brake. Other standard sizes from 300 to 2000 ton capacities.

Complete details or recommendations on any press brake work upon request

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IN 30 SIZES FOR IMMEDIATE DELIVERY FROM STOCK!

These are the new "SS" (Special Shape) Mounted Wheels now available through your Chicago Wheel supplier. You select from 6 Special Shapes instead of 200. You choose from 30 sizes in 3 specifications (see below). Best of all, you get *immediate delivery* of the finest quality mounted wheels. Research and industry practice have shown that the new "SS" Series Mounted Wheels cover 96% of all portable off-hand grinding needs. Ask your supplier for "SS" Chicago Wheels.

SPECIFICATIONS OF NEW "SS" MOUNTED WHEELS FOR IMMEDIATE DELIVERY

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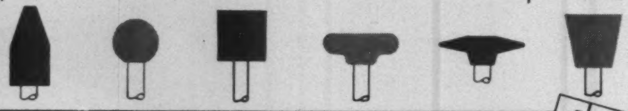
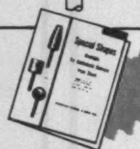
B	Die grinding, high rockwells; hardened tool steels, die steels	All sizes
C	Castings, iron and steel	Selected sizes





WRITE for your free copy of Bulletin SS-101 which fully illustrates and prices the new SS Series of CHICAGO Mounted Wheels.

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MEETINGS

Marking Device Assn. — Annual convention, Oct. 12-14, Hotel Roosevelt, New York, Association headquarters, 912 Chicago Ave., Evanston, Ill.

Steel Boiler Institute, Inc. — Fall meeting, Oct. 12-14, The Greenbrier, White Sulphur Springs, W. Va Institute headquarters, 1308 Land Title Bldg., Philadelphia.

The American Society of Mechanical Engineers—Rubber and Plastics Conference, Oct. 9-11. Hotel Lawrence, Erie, Pa. Society headquarters, 29 West 19th St., New York 18, N. Y.

Gray Iron Founders' Society, Inc.—Annual meeting, Oct. 12-14, Netherland Hilton Hotel, Cincinnati. Society headquarters, 930 National City-E. 6th Bldg., Cleveland.

Industrial Management Society—Annual national industrial engineering and management clinic, Oct. 13-14, Conrad Hilton Hotel, Chicago. Society headquarters, 330 South Wells St., Chicago 6, Ill.

Non-Ferrous Founders' Society—Annual meeting, Oct. 13-15, Grove Park Inn, Asheville, N. C. Society headquarters, 1604 Chicago Ave., Evanston, Ill.

Magnesium Assn. — Annual convention, Oct. 17-18, Cleveland. Association headquarters, 122 E. 42nd St., New York.

American Coke & Coal Chemicals Institute—Annual meeting, Oct. 17-18. The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 711 14th St., N. W., Washington, D. C.

Society for Non-Destructive Testing—20th Annual convention, Oct. 17-21, Philadelphia. Society headquarters, 1109 Hinman St., Evanston, Ill.

National Tool & Die Mfrs. Assn.—Annual convention, Oct. 19-23, Leamington Hotel, Minneapolis. Association headquarters, 907 Public Square Bldg., Cleveland.

WHERE DO YOU STAND ON COMPUTER CONTROL— LEADING OR LAGGING?

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	Coulter Steel & Forge Co.*†
	Earle M. Jorgensen Co.*†
	Kilsby Tube Supply, Division of Republic Supply Co. of Calif.•
	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
	Tubesales•
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	Earle M. Jorgensen Co.*†
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	Earle M. Jorgensen Co.*†
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Wichita	Earle M. Jorgensen Co.*†•
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MICHIGAN	
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	The Peninsular Steel Co.†
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	Service Steel Division Van Pelt Corp.•
	Tubular Sales•
Grand Rapids	The Peninsular Steel Co.†
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Jackson	O'Neal Steel, Inc.*†
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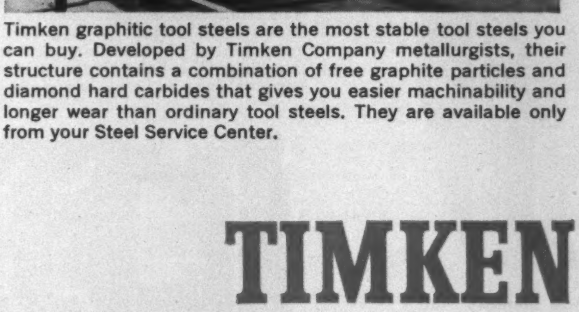
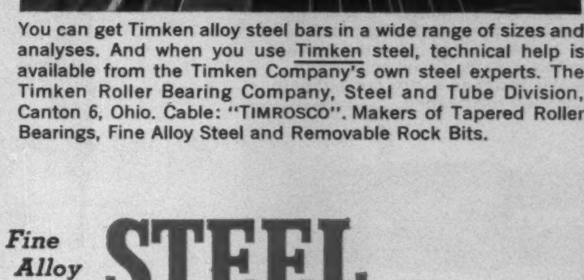
Your Steel Service Center supplies Timken® seamless steel tubing in carbon, alloy and stainless grades. And the Timken Company's 100% final inspection—of dimension, surface and internal quality—assures you it's the finest tubing available. Your Steel Service Center helps you save in other ways, too. It frees your inventory capital . . . releases your inventory space for more productive use. And you're assured of fast delivery of steel ready for use, cutting your processing cost, helping you maintain production schedules.



Timken graphitic tool steels are the most stable tool steels you can buy. Developed by Timken Company metallurgists, their structure contains a combination of free graphite particles and diamond hard carbides that gives you easier machinability and longer wear than ordinary tool steels. They are available only from your Steel Service Center.



You can get Timken alloy steel bars in a wide range of sizes and analyses. And when you use Timken steel, technical help is available from the Timken Company's own steel experts. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

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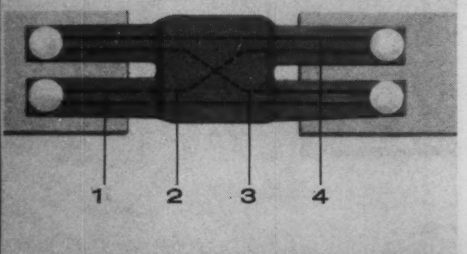
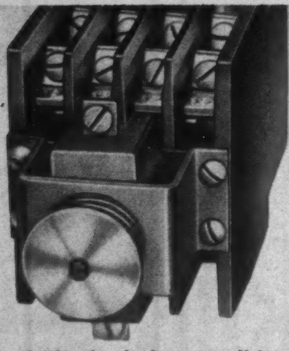
Another Cutler-Hammer first! Up to 24 poles in an area less than the size of a dollar bill.

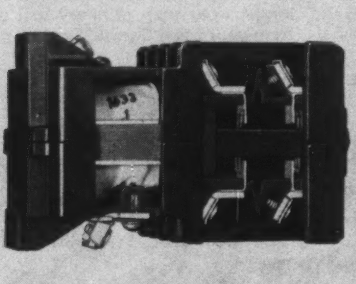
New contact reliability. Parallel bifurcated contacts, which allow four current paths instead of one, provide infinitely greater circuit reliability . . . liberally designed so any current path carries full relay rating.





At last! "Mechanical memory" latch as reliable as the relay itself! No adjustment ever needed. Add latch at any time.

New simplified design! Cutaway view shows basic simplicity. Coil vacuum impregnated to resist damage from humidity, vibration, electrical stress. Terminals can be screw or spade type.



CONTROL

Space savingest relay you've ever seen: New Cutler-Hammer "Compact 300"

Versatile 300 V. control relay is so reliable it's permanently sealed!

Here is the best answer yet to the need for an extremely reliable, small-size 300 V, 6 amp., industrial relay — the new "Compact 300" from Cutler-Hammer.

Every detail known that affects relay reliability has been improved in the "Compact 300." Bifurcated contacts which make possible *four* current paths rather than one, add millions of operations to the "Compact 300's" electrical reliability.

In fact, we're so confident of its electromechanical reliability, we permanently enclose the "Compact 300." And, if it should be damaged by a fault current, you throw it away and replace it with a new one. Its low price makes this an economical, practical maintenance procedure.

Now think of the space you can save with the "Compact 300." It controls up to eight circuits in panel space only 2" wide by 2¾" high. 2, 3, 4, 6 and 8 poles with any combination of N.O. or N.C. contacts are available, of course.

At any time, you can add "mechanical memory" latch with a life equal to the life of the relay. No adjustments are ever necessary. Contact your Cutler-Hammer distributor for details on the "Compact 300" or send for Pub. ED-L079-T246.

What's new at Cutler-Hammer? New, better products, like the 300 V. relay are coming steadily from our new, expanded plant facilities. We're ready now to help you take care of the great industrial growth of the future. If you are planning ahead and need electrical control assistance, contact the nearest Cutler-Hammer sales office.

WHAT'S NEW? ASK...

CUTLER-HAMMER

CONTROL

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Order specialty steels from your local Universal-Cyclops Specialty Steel Service Center and gain these cost-reducing advantages:

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A leading producer of specialty steels for over 75 years, Universal-Cyclops continues to supply you with highest quality steels, expanded services and stocks, and specialized technical assistance to help solve your metal-working problems.

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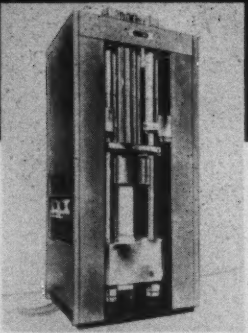
in jet engine turbine blades

Strength of turbine blades is a primary factor in the output and performance of jet engines. Since the inception of the jet age, engine builders have agreed that forged blades would offer greater strength. Now, with DYNAPAK, forging these intricate shapes, to the required tolerances, becomes a reality!

Turbine blades forged by DYNAPAK are now being tested by a major aircraft engine builder. Among the already obvious advantages: thin edges, superior grain flow, lower cost, and greater strength. And the use of multi-cavity dies holds promise of even lower costs to come!



DYNAPAK is industry's first high-energy-rate machine tool for forging, forming, compaction, and extrusion. This DYNAPAK machine (left), installed at Precision Forge Co., Santa Monica, California, is today producing turbine blades. DYNAPAK invites your inquiry, and an opportunity to solve your production problems.

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The super-stable *neutral* trichloroethylene from Dow —NEU-TRI®—gives you more mileage for your solvent dollar because it *stays* stable—even after prolonged periods of vapor degreasing. The powerful built-in stabilizer system in NEU-TRI protects parts and equipment from corrosion, staining and pitting . . . increases cleaning efficiency.

Dow also offers ALK-TRI®, the amine-stabilized tri with powerful solvency, and HI-TRI®, the trichloroethylene for cold cleaning missile components. HI-TRI has excellent shock sensitivity properties and leaves little or no residue.

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ASK YOUR DISTRIBUTOR of Dow solvents for this booklet on trichloroethylene. It highlights the features of NEU-TRI as a fast, efficient vapor degreasing solvent. Get in touch with your distributor or write to your nearest Dow sales office.

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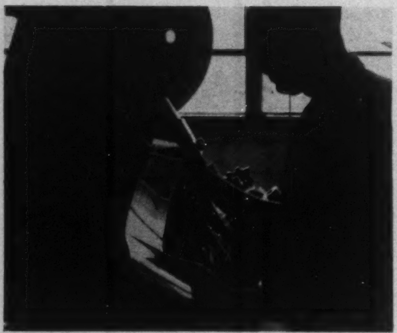
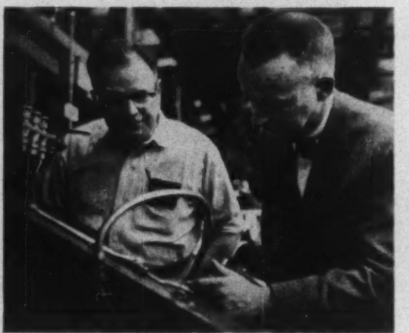


STRIP users! Special processing of Chase S-19 Brass Strip at the mill gives this metal finer, close-grain surface. Expert handling from mill to you protects it. Check coupon for more information about Chase strip.



WIRE users! There's a special service for you ...the expert assistance of the Chase Wire Service Man. He'll tell you which of the many wire alloys we make is best for what YOU make. To see him, check the coupon.

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gets them all!

Stocks and skills in metals that are outstanding in our industry are at your service and at your elbow, too, simply by calling Chase. You can be sure of the metals you need in the forms you want . . . when you want them.

But that's only part of Chase service. The industry's most complete network of warehouses and sales offices . . . metallurgical assistance from experts in their fields . . . painstaking care at the mill and in processing your order. You get all these—and more—when you rely on Chase.

Mail the coupon at right for up-to-the-minute stock lists. And phone your next order for aluminum, brass, copper and stainless to the Chase Multi-Metals Service Center near you—for service no other company can match.

Chase

BRASS & COPPER CO. WATERBURY 20, CONN.
Subsidiary of ***Kennecott Copper Corporation***

CHASE BRASS & COPPER CO.
DEPT. IA-9, WATERBURY 20, CONN.

Please send me the following literature:

☐ Aluminum Stock List ☐ Stainless Steel Stock List ☐ S-19 Brass ☐ 3-Mark Free-Cutting Rod ☐ Mill Products Catalog

☐ *Please have Wire Service Man get in touch with me.*

NAME & TITLE____________________

COMPANY____________________

STREET ADDRESS____________________

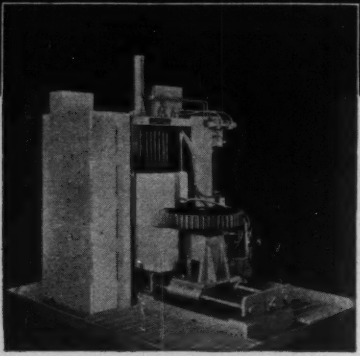
CITY__________ZONE_____STATE__________

MAGNETHERMIC
AJAX ELECTROTHERMIC
AJAX ENGINEERING
AJAX MAGNETHERMIC

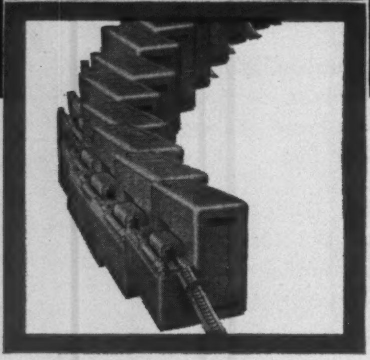
we like to be close to our customers...

and future customers!

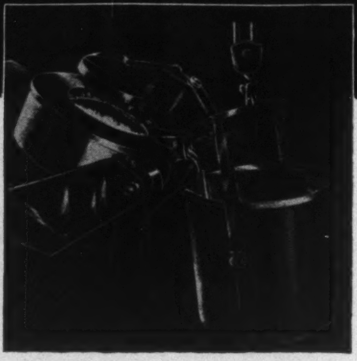
Ajax Magnethermic Representatives are located in major market areas. You will find the telephone number of the office in your area on the opposite page. Whether you want information on an application, or service on an existing installation, the Ajax Magnethermic man can give you assistance. He knows induction heating and melting.



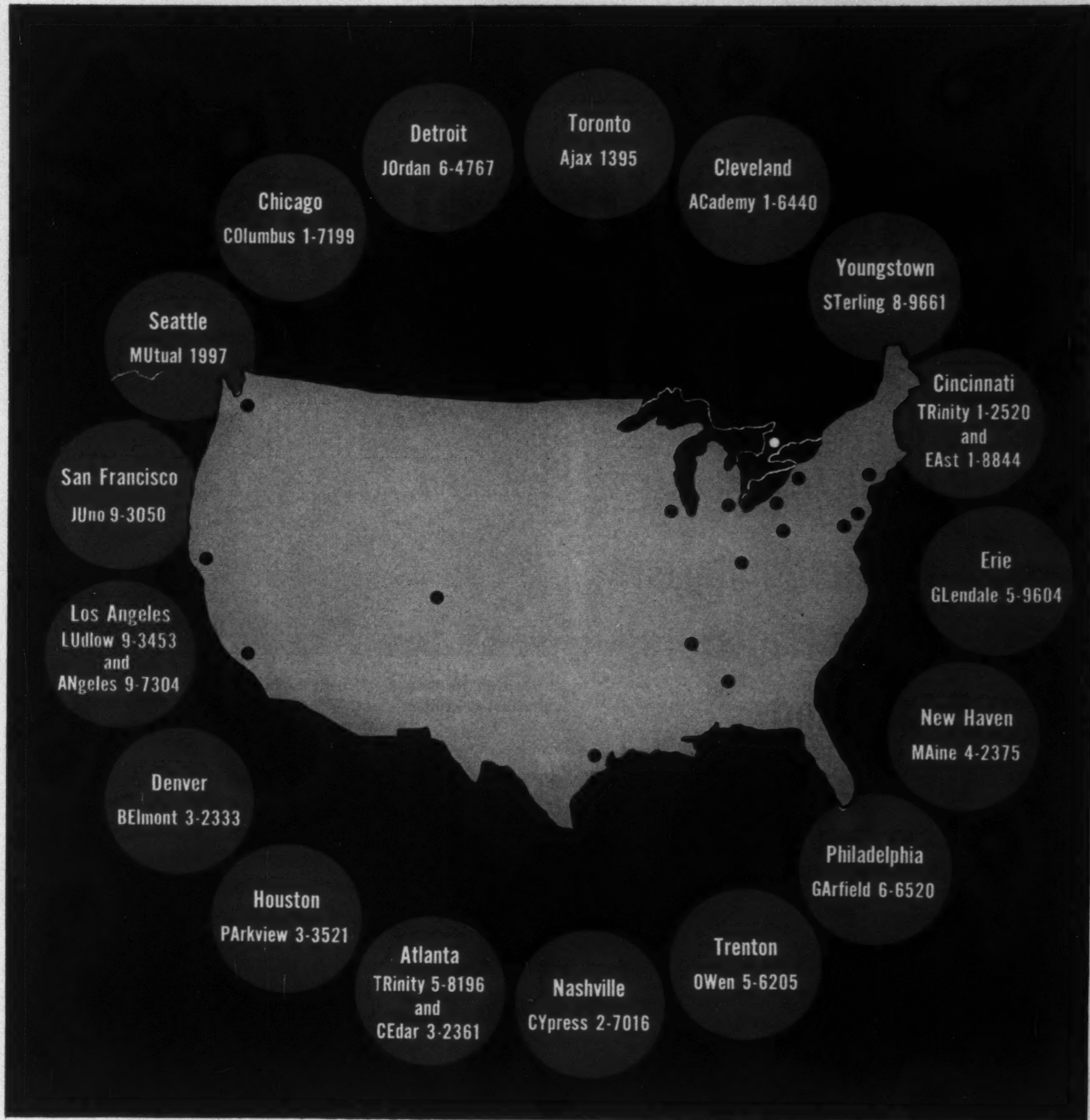
HEAT TREATING . . . AM makes Induction heat treating equipment for either high production or job shop operation. Shown above—the versatile gear hardener . . . heat treats 6" to 60" diameter gears.



BILLET HEATING . . . Press the button, that's all! The AM Billet Heater delivers a billet at exact temperature to the extrusion or forging press.



MELTING . . . AM supplies all types of Induction Melting Furnaces including: core, coreless, lift and automatic pouring, vacuum and degassing.

|	
Seattle	MUtual 1997
Chicago	COlumbus 1-7199
Detroit	JOrdan 6-4767
Toronto	Ajax 1395
Cleveland	ACademy 1-6440
Youngstown	STerling 8-9661
Cincinnati	TRinity 1-2520 and EAst 1-8844
Erie	GLendale 5-9604
New Haven	MAine 4-2375
Philadelphia	GArfield 6-6520
Trenton	OWen 5-6205
Nashville	CYpress 2-7016
Atlanta	TRinity 5-8196 and CEdar 3-2361
Houston	PArkview 3-3521
Denver	BElmont 3-2333
Los Angeles	LUdlow 9-3453 and ANgeles 9-7304
San Francisco	JUno 9-3050

induction heating is our only business!

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YOUNGSTOWN DIVISION
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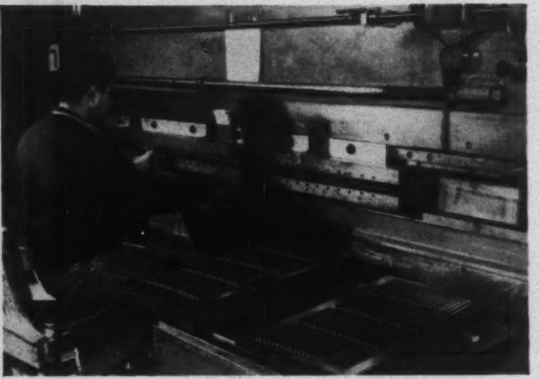
Superior Pre-Paint Protection Racks Up More Sales,

Paint Adhesion of Air Conditioning and Heating Registers, Grilles and Diffusers Insured by Granodine



Precision forming equipment turns coil stock steel into product at Krueger plant.

Krueger management-manufacturing team: Left to Right—J. B. Smith, Vice-President of Production; President Leo Krueger; and Ted Kleckner, Vice-President and Comptroller.

At major parts producer, Krueger Air Conditioning Corporation, registers, grilles and diffusers are treated with Amchem Granodine before painting to provide them with what Krueger officials agree is a "superior finish that extends the life of our products."

FINISHING PROBLEM SOLVED

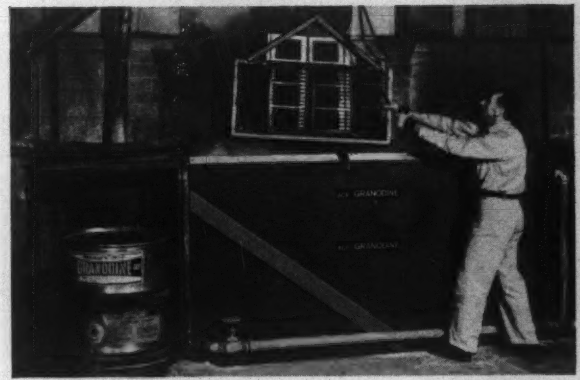
Before selecting Granodine as their standard phosphating treatment, Krueger had tried several competitive processes but were unable to sustain the final quality or eliminate rust from painted products. The results—customer complaints and rejects running up to 10 percent of total production.

Today, after three years of utilizing Granodine in a five-stage dip phosphating process, Krueger, one of the world's largest manufacturers of registers, grilles and diffusers reports virtually no rejects, increased volume and an all-around better paint finish.

COMPARISONS SELL

To tell their superior finish story Krueger sets up effective side-by-side demonstrations of untreated products and products treated with Granodine at heating trade shows. Customer interest in such displays is high and has led to more sales through

# of Amchem GRANODINE* Fewer Rejects For Krueger



Operator employing electric hoist, lowers load of Krueger products into Granodine dip tank.

Paint line conveyor carries painted Krueger products from water-washer spray booth to inspection area.

graphic illustration of competitive advantages on Krueger's part.

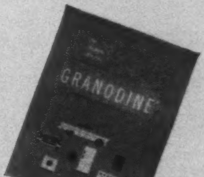
Further support comes to Krueger through the use of Granodine when bidding for and successfully securing Government contracts and projects involving architects where rigid specifications exist for pre-paint finishing.

NEW SYSTEM PLANNED

Looking to the future, Krueger—with a 400 percent increase in sales over the last six years—is currently adding a new 10 acre, 100,000 square foot plant. High on the planning list is a new and virtually completely automated Granodine line. Amchem engineers have designed a unique conveyorized system utilizing overhead cleaning, rinsing and coating of Krueger products which will achieve significant cost savings and substantial reduction in gas consumption through a colder method in the clean-coat phase of the process.

If you are interested in a *superior finish* for steel products—it will pay you to investigate Granodine, the *superior phosphating* process. Your local Amchem Representative can supply the details on how you can quickly and conveniently make the switch to Granodine without interrupting production or re-designing processing facilities, while providing a substantial increase in quality of product finish!

Write for Bulletin 1380B containing detailed information on Granodine for steel . . . the finish that lasts.



***Granodine is Amchem's registered trademark for the conversion coating chemical used to produce phosphate coatings on steel.**

AMCHEM ®GRANODINE

Amchem is a registered trademark of **AMCHEM PRODUCTS, INC.** (Formerly American Chemical Paint Co.)
AMBLER, PA. • St. Joseph, Missouri • Detroit, Michigan • Niles, California • Windsor, Ont.

CONNORS [illegible] sections of steel

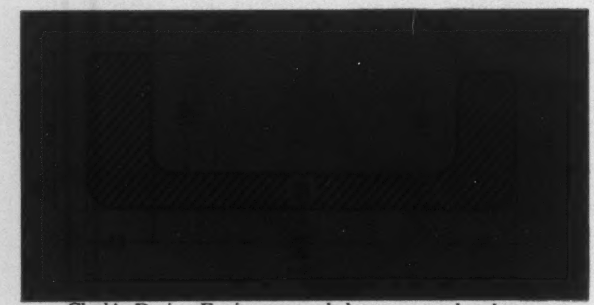
CLARK
CLARK R 700

Clark Ranger-700 Lifts Truck Trailer Load of New Cars – New Truck Can Lift 35 Tons.

"This Connors Special Section makes our upright the best built upright in the industry," says John G. Mack, Vice President of Purchasing, Clark Equipment Company.

"Connors special rolled steel sections permitted us to improve our design and provide an upright with just the proper weight distribution for the ultimate in strength," notes Mr. Mack.

"By utilizing these special, high quality sections, we have given our customers the best design with better wearing qualities and have also expedited our assembly, thereby increasing production efficiency."



Clark's Design Engineers needed an uneven leg, heavy channel section to work in conjunction with an "I" beam section in their lift truck mast assembly. Connors produced and hot rolled a special section designed to meet their rigid specifications – providing proper weight distribution and the ultimate in strength.

Investigate the advantages of special sections.

For illustrated brochure or consultation write or call Connors — Specialists in Special Sections
CONNORS STEEL DIVISION, P. O. BOX 118D, HUNTINGTON, WEST VIRGINIA • PHONE JAckson 9-7171

CONNORS STEEL DIVISION **PORTER** ***H.K. PORTER COMPANY, INC.***

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

World's largest electrical precipitators for basic oxygen steelmaking

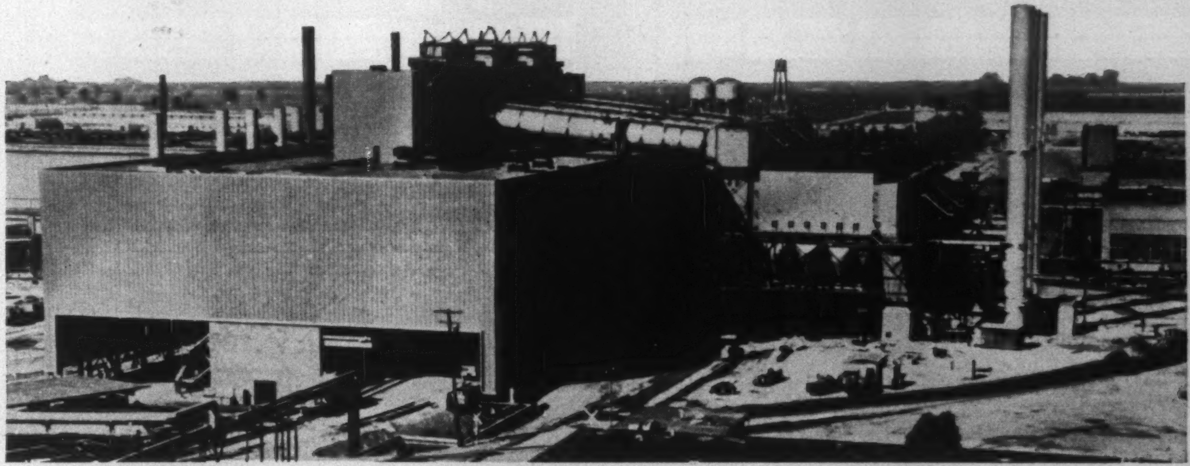
The Cottrell precipitators at the right of the photo remove dust and fume from waste gases at the Kaiser Fontana Plant with 99.8% efficiency. This huge new basic oxygen steel plant was designed and constructed by Kaiser Engineers.

The three Cottrells were designed and built by Research-Cottrell to clean 607,500 cubic feet of gas per minute from the oxygen furnaces. They are installed between the furnace exhaust ducts and the fans serving the three stacks seen at right below.

The high gas cleaning efficiency of this installation is obtained by means of tested and proven Cottrell design features including electrical sectionalization, Opzel collecting plates, and continuous, automatic operation of high tension rappers and M.I. plate rappers.

Research-Cottrell provides the most modern and comprehensive engineering and equipment available, based on hundreds of Cottrell installations all over the world.

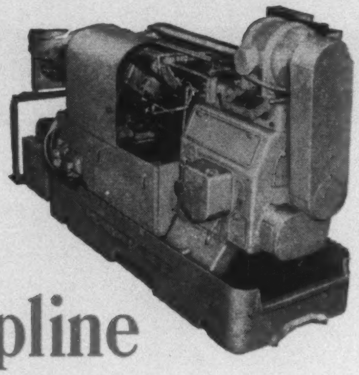
For further information call on...



Research-Cottrell

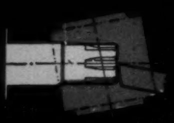
RESEARCH-COTTRELL, INC., Main Office and Plant: Bound Brook, N. J.
Representatives in principal cities of U.S. and Canada

RC-210

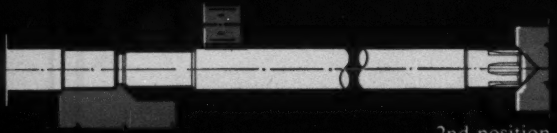


Acme-Gridley performs spline hobbing in a single set-up . . .

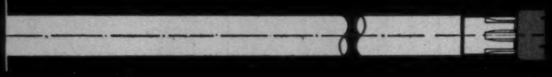
slashes ringer roll shaft production time 63%!



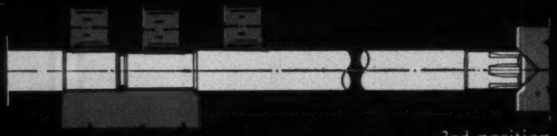
5th position
Hob Spline—Face Front (spindle clutch disengaged, spindle driven from hobbing attachment)



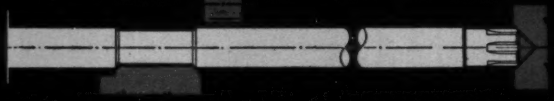
2nd position
Form Spline Dia. of Next Piece and Breakdown for Cut-off—Support



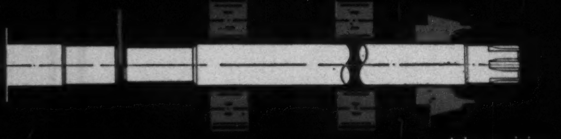
6th position
Feed Stock



3rd position
Shave Rear Dia. and Spline Dia.—Support



1st position
Form Rear Dia. Past Cut-off—Support



4th position
Support—Pick-up—Cut-off

6 Operations in 27.9 Seconds

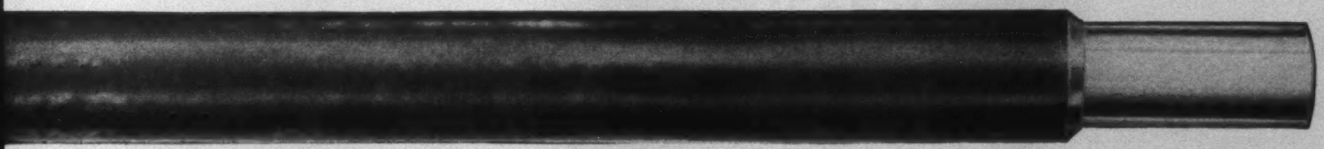
Here's how imaginative National Acme solutions to tough machining problems extend total machine capability and pay off in *tangible* production savings.

Spline hobbing is generally considered beyond automatic bar machine capability. Yet, an ingenious National Acme hobbing attachment . . . installed on an Acme-Gridley 1¼" RA-6 with modifications . . . lets a well-known manufacturer of ringer roll shafts do spline hobbing in the primary set-up; has cut per-piece production time 63%. In addition, a unique automatic feeding arrangement has drastically reduced stock-loading downtime.

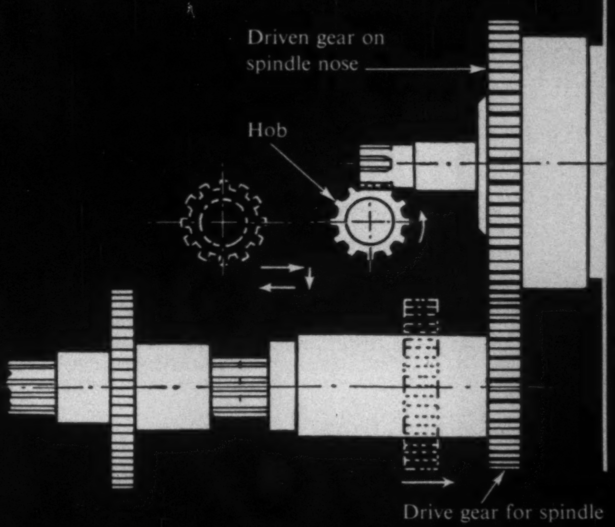
Special attachments like the spline hobber, plus such standard features as direct camming, independently operated toolslides, and a wide open tooling zone are the reason Acme-Gridley capability is limited by imagination only. No wonder cost-conscious manufacturers everywhere depend on Acme-Gridleys for higher mass production efficiency at lower cost. Detailed information on the world's most complete line of multiple and single-spindle automatic bar and chucking machines is yours for the asking. Call, write or wire.

National Acme's "Zone of Responsibility" includes all phases of cost reduction. Check YOURS . . . Then Check National Acme

Direct Costs: these include direct dollar savings as realized by thousands of manufacturers . . . an "everyday" job for Acme-Gridleys. **Indirect Costs:** effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc. **Product Redesign:** teaming with your design group to take full advantage of Acme-Gridley's cost reducing capabilities. **Direct Material Costs:** our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems. **Make-or-Buy Reviews:** in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment. **Spot Modernization:** pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.



Spline hobbing in the fifth position . . . a closer look



When the hobbing attachment advances, a gear on the attachment engages a gear on the spindle nose and drives the spindle at the required speed for hobbing.

MODERN MACHINE TOOLS
MMT•PE
PRODUCTION EFFICIENCY

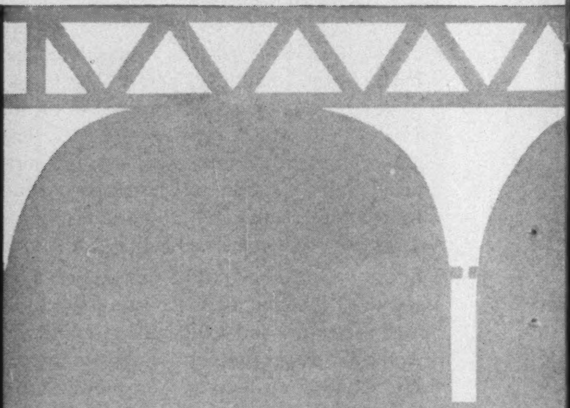
National Acme

THE NATIONAL
ACME COMPANY
175 E. 131st STREET
CLEVELAND 8, OHIO

Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

prediction

NEVER BEFORE SO MANY TREND-SETTING DEVELOPMENTS



NEW DEVELOPMENTS IN AUTOMATED STEELMAKING

●

ADVANCED EQUIPMENT NOT EXHIBITED PUBLICLY BEFORE

●

NEW OXYGEN PROCESSES — INCLUDING AJAX, L-D, ROTOR AND KALDO

●

REPORT ON SOVIET FERROUS METALLURGY

●

NEW PROCESS FOR CHANGING STEEL CHEMISTRY THROUGH OPERATING PRACTICE

●

NEW TECHNIQUES IN INCREASING BLAST FURNACE OUTPUT THROUGH ELEVATING TEMPERATURES

●

COMPLETELY AUTOMATED ROLLING MILL

●

NEW BULK GREASE-HANDLING SYSTEM

●

NEW FURNACE DESIGNS

●

OTHER NEW DEVELOPMENTS IN COMBUSTION . . . ELECTRICAL . . . SAFETY . . . ROLLING MILL . . . AUTOMATIC CONTROL . . . AND MECHANICAL PRACTICES

BE ONE OF 15,000 WHO WILL ATTEND to see and hear discussed the many advanced developments of today that will be standard operating practice in the future. Four full days of technical sessions (42 in all) will be held concurrently with AISE's largest Exposition (206 exhibitors, 15% more area than the largest previous show).

No man concerned with steelmaking or plant maintenance can afford to miss this opportunity of reviewing *the new, the technical, the significant!*

1960 IRON AND STEEL CONVENTION AND EXPOSITION

Sponsored by Association of Iron and Steel Engineers, 1010 Empire Building—Pittsburgh [illegible]

SEPTEMBER 27-28-29-30, 1960 • CLEVELAND PUBLIC AUDITORIUM

MORGAN
STRIPPING 800000LBS
HOIST 80000LBS
A. HOIST 50000LBS

Morgan Crane selected for wide mill expansion program

This Morgan stripping crane was recently installed at Alan Wood Steel Co. in Conshohocken, Pennsylvania, in connection with their wide mill expansion program. Advanced features such as auxiliary hoist, stool breaker, 400-ton stripping capacity and traditional Morgan efficiency have been included in this universal type ingot stripping crane.

For large tough jobs where efficiency and dependability are a *must*, Morgan cranes pay off time after time. This is one of the reasons Morgan Engineering gets so many repeat orders from its customers.

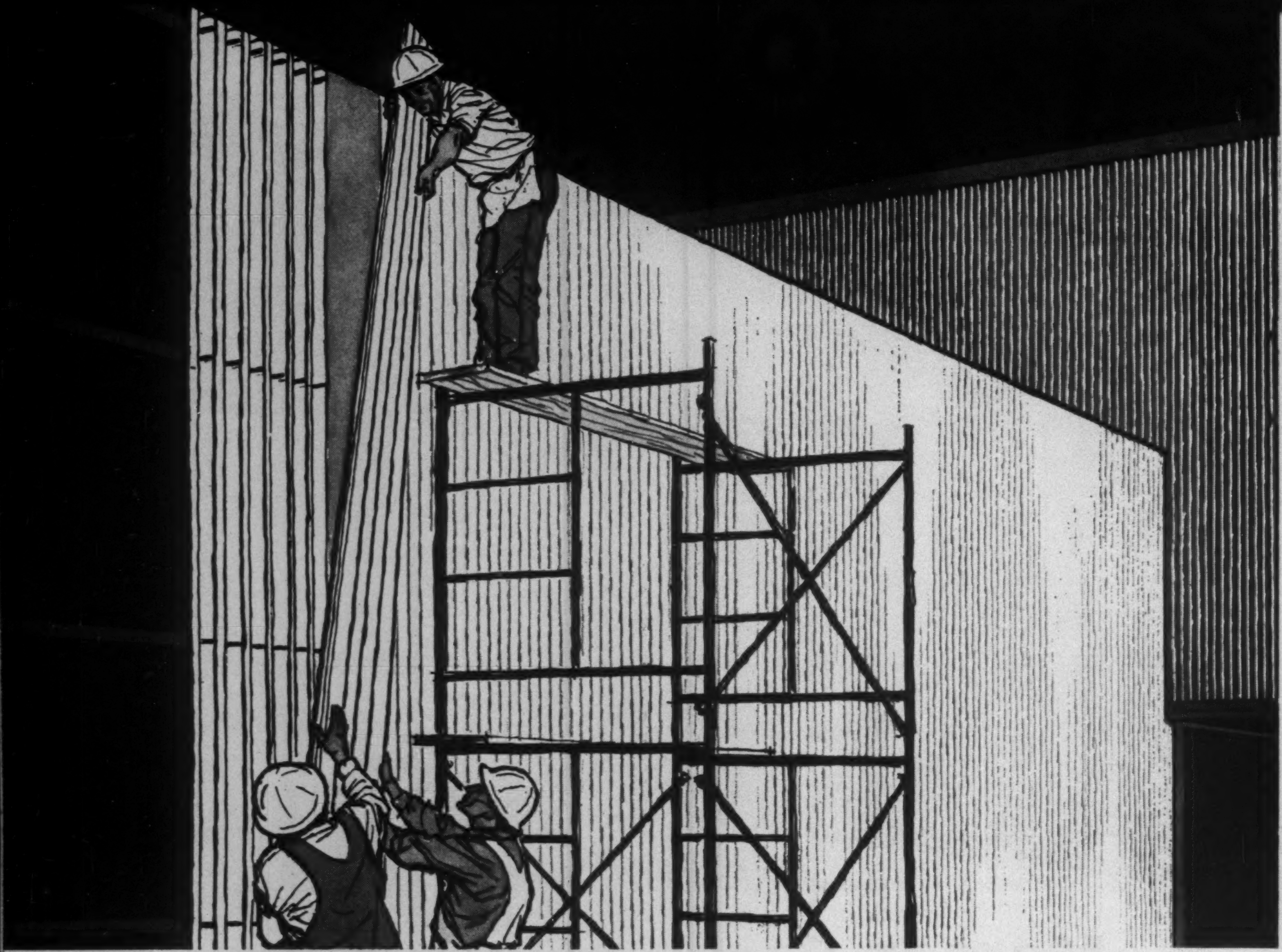
If cranes are included in your expansion or modernization plans, be sure to get in touch with the Morgan people.

E.O.C.I. MEMBER

THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*

SEE US
AT THE
Iron & Steel
EXPOSITION
SEPT. 27, 28, 29, 30
CLEVELAND, OHIO
BOOTHS 138 AND 139

Overhead electric traveling cranes, gantry cranes,
open hearth special cranes, blooming mills, structural mills,
shears, saws, auxiliary equipment and welded fabrications.



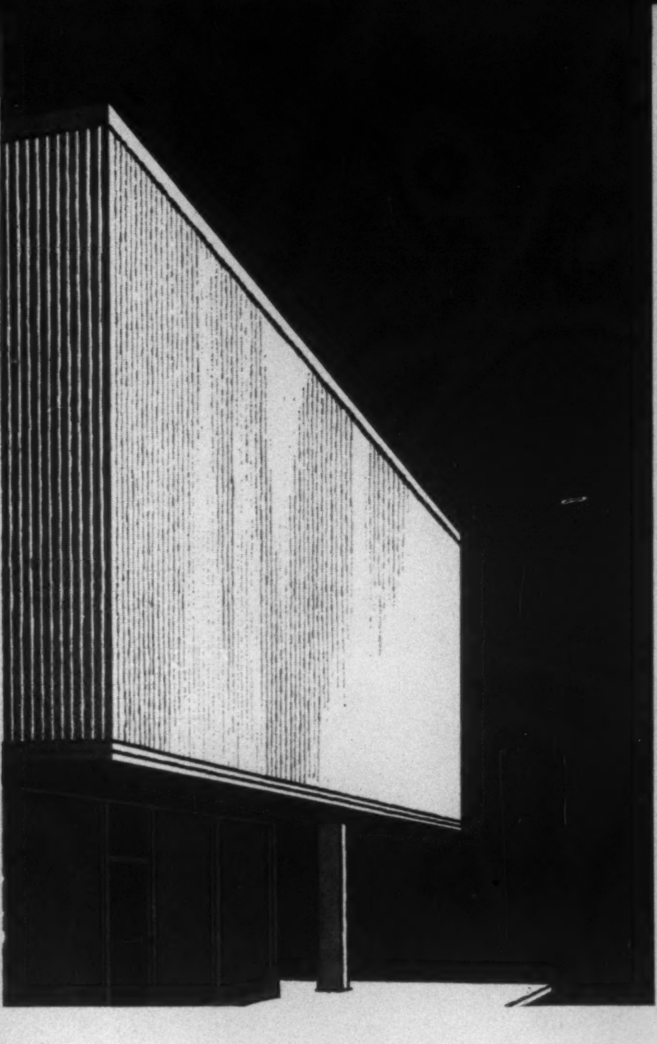
NEW TRUSCON CURTAIN WALL PANELS INSULATED OR NON-INSULATED...LOW COST FOR COMMERCIAL AND INDUSTRIAL BUILDINGS

Notice the sharp, clean interior lines presented by Truscon 24″ FERROBORD and Insulated Wall Panels.

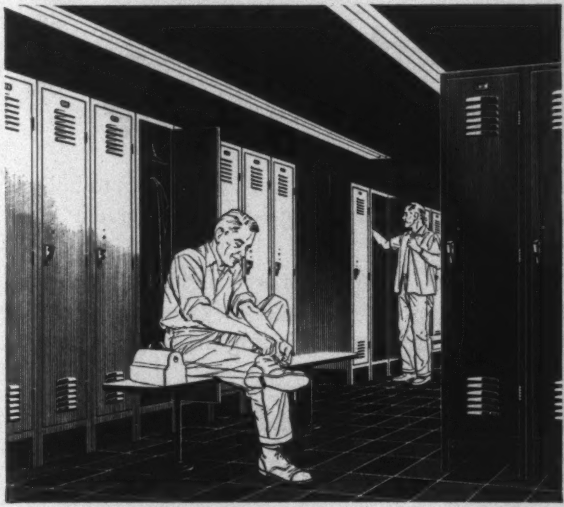
Truscon Curtain Wall Panels, insulated or non-insulated, are the answer to fast, economical commercial and industrial housing. Architecturally beautiful to blend with modern industrial park, commercial service and shopping centers.

Truscon Insulated Panels are constructed by sandwiching a layer of insulating material between two sheets of Truscon 24″ Ferrobord® or galvanized ribbed sheeting. Panels are securely interlocked and button-punched for maximum weather-tightness. Panels are furnished painted or galvanized, in widths of 2′-0″, and up to 40′-0″ in length.

Low installation cost, very little maintenance cost, and available for immediate delivery. Call your Truscon representative, or write direct for additional data.



LOW COST WASH AND CHANGE FACILITIES: Republic Steel Lockers are designed and built for maximum efficiency and economy. Strong, sturdy, steel construction for easy installation, long life, low maintenance. Full inside locker roominess, ventilation, safety. Bonderized. Available in many sizes, colors, and locking systems. And, Republic offers complete locker planning and installation service. Write for complete information.



LOW COST SHIPPING: Republic Coil Covers speed and simplify freight handling, protect cargoes in transit, stop vandalism. Designed for use on standard gondola and flat cars. Approximately 22 feet long, 6 feet wide, 6 feet high. Two covers are furnished for each car. Heavy-duty construction, easy to handle by overhead or track-side cranes. Six specially designed stacking brackets permit easy tiering. Call your Republic representative, or send coupon.

FAST, STRONGER, SAFE, LOW COST FRAMING: Republic METAL LUMBER solves framing problems fast. Simply measure, cut, assemble, with bolt and nut fasteners. Slotted angle pattern provides greater flexibility. Ideal for custom-built storage bins, storage racks, work benches, cat-walks. Available in two gages, two widths, in standard bundles of 10- or 12-foot lengths, complete with self-locking bolts and nuts. Order from your Republic-Berger warehouse or write direct for attractive brochure and data.

REPUBLIC STEEL

REPUBLIC STEEL

World's Widest Range
of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
Dept. IA-1067
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on the following products:

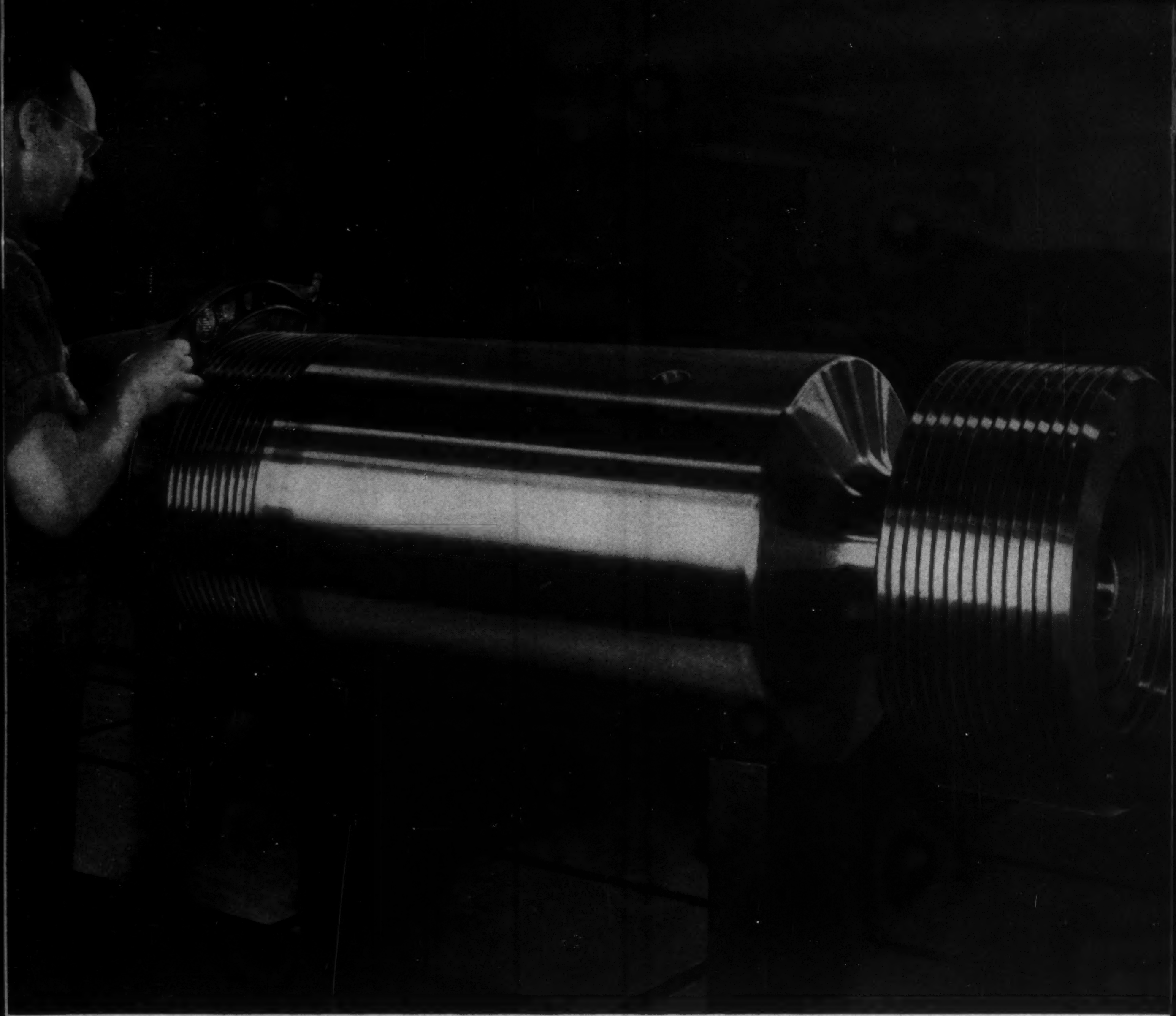
- ☐ Truscon Insulated Curtain Wall Panels
- ☐ Republic Steel Coil Covers ☐ Republic Steel Lockers
- ☐ Republic METAL LUMBER®

Name____________________Title__________

Firm______________________________

Address____________________________

City________________Zone_____State________



WHO FORGES THE TOUGH ONES?...
and precision-machines them, too?

When the forgings come as tough as this motor housing, the customers come to National Forge. On this job (for a chemical manufacturer), we had to forge and precision-machine to extremely close dimensional tolerances (+.0020″, −.0002″ including run-out).

National Forge handled the complete production—from melting AISI E4340 steel, to forging, to hollow boring, to finish-machining—in our integrated "one-source" plant.

You say *your* forging specs are tough? Call National Forge, the company with over 40 years' experience in forging and precision-machining the tough ones.

NATIONAL FORGE COMPANY

IRVINE, WARREN COUNTY, PENNSYLVANIA

For more information on "the tough ones," and the machinery that makes them "best"—write for bulletin NF 59-02

NF-59-01

Metallurgical Memo from General Electric

General Electric announces pre-honed CARBOLOY® inserts

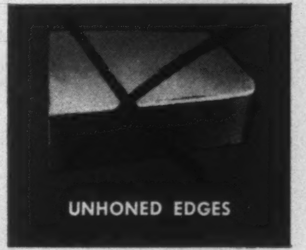
HAND HONING

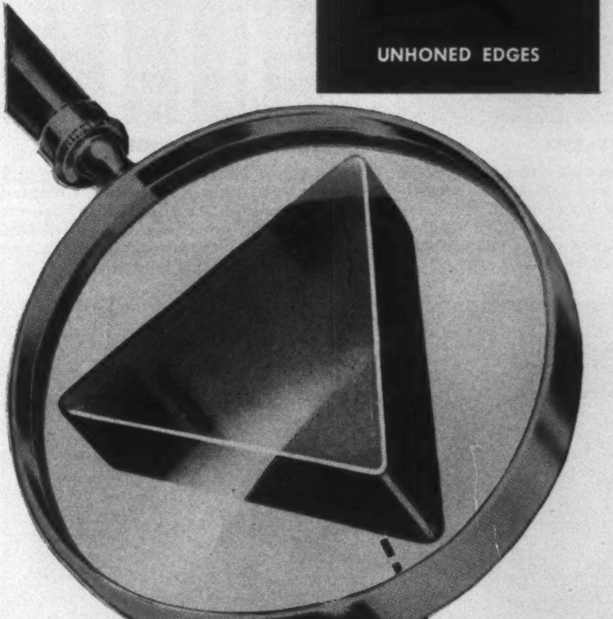
Hand-honing is inaccurate, and time-consuming—frequently results in premature chipping and breaking.

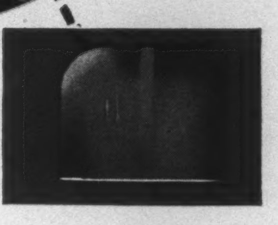
45° MACHINE CHAMFER

Chamfered, or ground-flat, edges are geometrically weaker than a radius and are more easily chipped or broken.

Unhoned or as-ground inserts show rough edges—result in unpredictable tool life due to chipping.







Shown here, both under magnification and graphically, is an edge of the new Carboloy pre-honed insert. Radius is geometrically ideal to minimize chipping, extend tool life many times.

Now you get more predictable tool life... lower cost per cutting edge ...no hand-honing cost!

Ready-to-use... honed to a precise radius... promise BETTER PROFITS THROUGH BETTER TOOLING

Now General Electric Carboloy inserts are pre-honed *at the factory!* Here's what it means to you:

1. An insert with edges honed to precise *radii* gives the strongest geometric shape to withstand cutting pressures. This reduces chipping – increases the predictability of tool life. Hand honing *cannot* achieve precise radii – G-E pre-honing can . . . and does!
2. Since chipping is minimized, fewer cutting edges are wasted. The result is lower cost per cutting edge.
3. Since inserts come pre-honed and ready-to-use, the labor cost of hand honing is eliminated. This more than offsets the charge for pre-honing.
4. Pre-honed Carboloy cemented carbide inserts have standard edge radii honed to a greater or lesser degree, depending on the job to be done. You'll *know* the honing is right!

Ask your Authorized Carboloy Distributor about pre-honed Carboloy inserts, convertible seats, toolholders, and brazed tools. Or, write: *Metallurgical Products Department of General Electric Company, 11153 E. 8 Mile Blvd., Detroit 32, Michigan.*

TOPS IN TOOLING QUALITY

From the research and quality-control facilities of the Metallurgical Products Department of General Electric comes the outstanding quality tooling line in the metalworking industry. The new Carboloy pre-honed inserts, as well as the complete line of Carboloy toolholders, inserts, insert seats, convertible seats, and brazed tooling, are designed to meet every tooling need efficiently and economically.

CARBOLOY.
CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT
GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES
MAN-MADE DIAMONDS • MAGNETIC MATERIALS
THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

UP TO 40 TIMES LONGER WEAR

LINDE's FLAME-

—the 6,000-degree, supersonic process that "welds" tungsten carbide and other materials to working surfaces—giving them today's greatest resistance to abrasion, galling, erosion, fretting, corrosion, and high-temperature wear

LONGER service life . . . less down time . . . fewer rejects . . . reduced operating costs!

These are only a few of the important advantages that LINDE's Flame-Plating process builds into machines, parts, accessories, and products that depend on the stamina of metal surfaces for required performance. Exclusive Flame-Plating guns literally "blast" molten particles of tungsten carbide or aluminum oxide at specific areas—at 2,500 fps—depositing a hard, welded-on coating which can be precision-finished to the desired microinches rms.

Dimensional stability unchanged

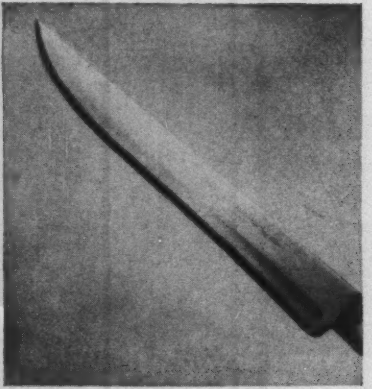
While temperatures above 6,000°F. are reached within the oxy-acetylene detonation gun, the temperature of the work piece is maintained below 250°F. This eliminates warpage or distortion of even minute precision parts.

Depending on thickness of finish applied, or use of the wearing part, Flame-Plating has been known to multiply wear resistance more than 40 times.

Hundreds of potential applications

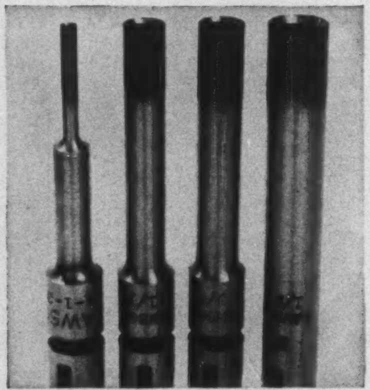
Other properties include low coefficient of friction, porosity less than one per cent, and excellent corrosion resistance. Coatings show outstanding reliability under high temperature, heavy load, and lack of lubrication or cooling.

The list on the right-hand page (opposite) shows a few of the many current and possible applications for Flame-Plating. Perhaps the process could be used profitably in one or more of your operations. We suggest you indicate your possible applications on the coupon and mail today for more information.



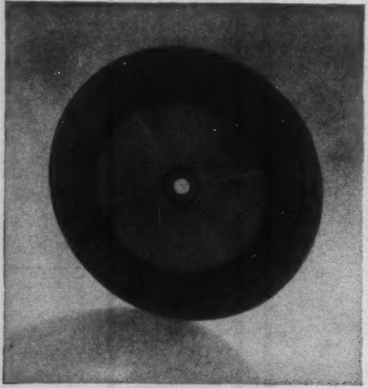
ROBESON CUTLERY

LINDE's Flame-Plating provides Robeson Cutlery Co., Inc., with a distinctive merchandising theme. The Robeson line of *"Flame Edge"* cutlery is featured as "The Greatest Development in 2000 years of Cutlery Making—a Cutting Edge of Tungsten Carbide."



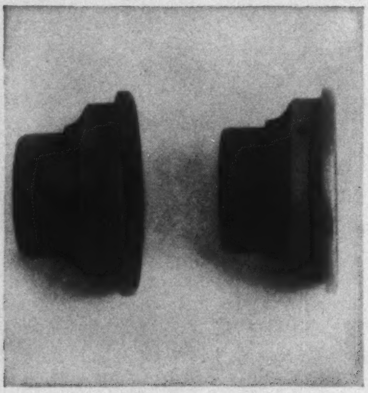
LAWSON PAPER DRILLS

Paper manufacturers report increases in drill life up to 20 times with Lawson Company Flame-Plated tips. Less "puckering" delivers better quality; fewer stops for sharpening bring savings which outweigh the extra cost of Flame-Plating many times over.



RUBBER SKIVING KNIVES

Before Flame-Plating, skiving knives used in the rubber industry had to be sharpened after every shift. Since adoption of Flame-Plating the service life of this tool has been increased 15 times. A sharp edge is always present, due to a *self-sharpening* effect.



SEAMING CHUCKS

LINDE's Flame-Plating is an important time-and-money-saver for the abrasive-resistant, tolerance-stable seaming chucks used by major canners. Operating life is more than 4 times longer. Chucks, when worn, can be salvaged, replated, and returned to use.

for Metal Parts — Metal-Coated by

PLATING

THE "LINDE" FLAME-PLATING GUN—and how it works

In LINDE's revolutionary Flame-Plating process, precise quantities of oxygen, acetylene, and tungsten carbide powder—representing "powder and shot"—are fed into the gun by a special mechanism. The gun is aimed at the areas to be coated, then fired by remote control. Precision-controlled rapid-firing (4 per second) builds up the coating to the desired thickness. The as-coated smoothness of 125 microinches rms can be finished down to better than 1 microinch rms finish.

PHYSICAL DATA—FLAME-PLATED COATINGS

COATING DESIGNATION	LW-1	LW-1N	LW-5	LC-1A	LA-2
Approx. Composition by weight	Tungsten Carbide +6% to 8% Co	Tungsten Carbide +13% to 16% Co	25% WC +7% Ni + mixed W-Cr Carbides	85% $Cr_3 C_2$ + 15% Ni-Cr	99% +Al_2O_3 (gamma)
Hardness Vicker's (VPN_{300})	1200 to 1450	1050 to 1150 VPN 70 to 71 R.	1000 to 1200 VPN	850 VPN	1000 to 1200 VPN
Maximum temp. in oxidizing atmosphere	1000°F.	1000°F.	1400°F.	1800°F.	1200°F. to 1800°F.
Coefficient of thermal expansion	4.0 x 10^{-6}/°F. Avg. 70 to 1000°F.	4.7 x 10^{-6}/°F. Avg. 70 to 1000°F.	4.6 x 10^{-6}/°F. Avg. 70 to 1400°F.	6.4 x 10^{-6}/°F. Avg. 70 to 1800°F.	3.9 x 10^{-6}/°F. Avg. 70 to 1832°F.
Modulus of Rupture	67,000 psi	80,000 to 106,000 psi	40,000 psi	75,000 psi	22,000 psi
Modulus of Elasticity	44 x 10^6 psi	42 to 40 x 10^6 psi	17 x 10^6 psi	22 x 10^6 psi	16 x 10^6 psi
Porosity	0.5%	0.5 to 1.0%	0.5%	0.5%	1.0%
Specific Gravity	14.2	13.2	10.1	6.54	3.45
Specific Heat	0.048	0.056	0.070	0.127	0.196
Thermal Conductivity	5.3 at 500°F.	5.3 at 500°F.	3.8 at 500°F.	4.3 at 500°F.	0.86 at 500°F.
Main features	Extreme wear resistance	Excellent wear resistance + increased resist. to mechanical and thermal shock.	Excellent wear resist. to higher temps. Improved corrosion resist.	Good wear resist. at high temp. or in corrosive media. Resists flame impingement.	Excellent resist. to wear, chem. attack and high temperature deterioration.

LINDE COMPANY

Division of Union Carbide Corporation

UNION CARBIDE

LINDE and UNION CARBIDE
are trade-marks of Union Carbide Corporation.

TYPICAL FLAME-PLATING APPLICATIONS

- **BEARINGS** — sleeve, roller, gas
- **BLADES** — aircraft turbine; doctor blades for papermaking
- **BLOCKS** — anvil
- **BUSHINGS** — ball piston pump
- **CHUCKS** — seaming
- **CUTLERY** — household
- **CUTTING, INDUSTRIAL** — rubber, plastic, skiving knives, foods, paper, slitter knives, chipper knives, discontinuous chip-abrasive materials
- **DIES, TOOLING** — cold-forming; coring punches, core rods, sizing punches, capstans
- **DOGS** — sewing machine feed; gripping dogs
- **DRILLS** — paper, acoustical tile, twist
- **GAGES** — plug, ring, air
- **GUIDES** — wire, textile, machine
- **HYDRAULICS** — pistons, liners, valve plates, wobble plates, metering valves, servo valves, slippers
- **MANDRELS** — wire-forming
- **PARTS** — sintered
- **PISTON RINGS**
- **PLATES** — valve, wear
- **SEALS** — turbine engine, pump
- **SURGICAL** — needle holders and shears
- **VALVES** — aircraft

I-922

Linde Company, Flame-Plating
270 Park Avenue
New York 17, New York

I am interested in Flame-Plating for the following application(s):

____

____

____

NAME__________ TITLE______

COMPANY________________

ADDRESS________________

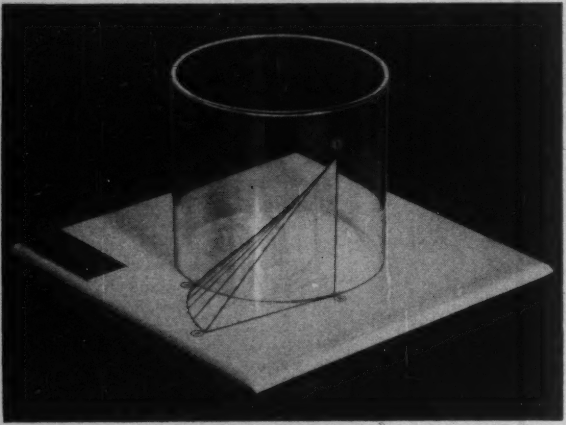
CITY______ ZONE___ STATE____

WORM GEARING

Why the INVOLUTE HELICOID thread form?

Introduction of involute helicoid worms by Delroyd marks the first time extensive use of this design has occurred in America. Therefore the question arises: "What is the involute helicoid worm and what are its advantages?"

Basically an involute helicoid worm is the same as an involute helical gear. However, this similarity is not easily recognized because of the difference in angle of thread or tooth helixes in the two types. Regardless of the difference in helix angles, both types have an involute thread or tooth profile in the transverse plane, i.e., a plane perpendicular to the axis.



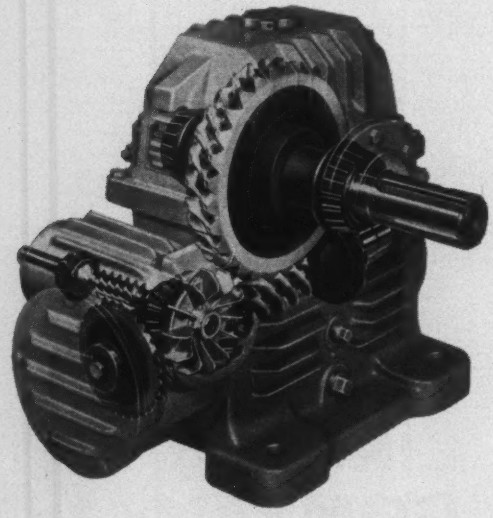
The thread surface is made up of a series of involute curves lying in transverse planes. The thread flank generating edge is a straight line tracing out a helical path (see illustration). Manufacturing *simplicity* of generating and checking to straight line form control provides consistent production of worm and generating hobs of high *accuracy*. Deviation from the straight line in checking *hundreds* of worms in one production lot can be held to within a few *ten* thousandths of an inch.

The easy and accurate attainment of *exact similarity* between worm and hob provides complete compatibility of worm to gear without manufacturing process interruptions to modify and change hob form. Form does not change as hobs are sharpened. Accurate interchangeability is an undisputed fact.

Only the involute helicoid worm form permits practical application of calculable compensating features for gear deflection under load. All gears have leaving side contact with entering side gap to form beneficial oil wedge. Kinematically accurate tooth meshing avoids the acceleration and deceleration inevitable with other forms.

Superior performance is the result, since this form outperforms all others. Size for size, the DELROYD involute helicoid worm form offers a higher selection safety factor with no premium cost.

For further information on DELROYD worm gearing, write on your company letterhead for our new 84-page catalog, the most comprehensive in the industry.



DE LAVAL STEAM TURBINE COMPANY

899 NOTTINGHAM WAY, TRENTON 2, N. J.

DL-801

HASTELLOY ALLOY X CUTS HEAT-TREATING COSTS

resists oxidation, carburization, 2,000°f......

3
BIG
REASONS
WHY
HASTELLOY
TRADE MARK
ALLOY X
CUTS
HEAT-
TREATING
COSTS

1

Strong in Oxidizing Atmospheres

HASTELLOY alloy X gained weight when exposed to dry air at 2000 deg. F . . . and retained the weight gain up to 100 hours exposure. This weight gain helps alloy X to remain strong when exposed to oxidation and heat.

2

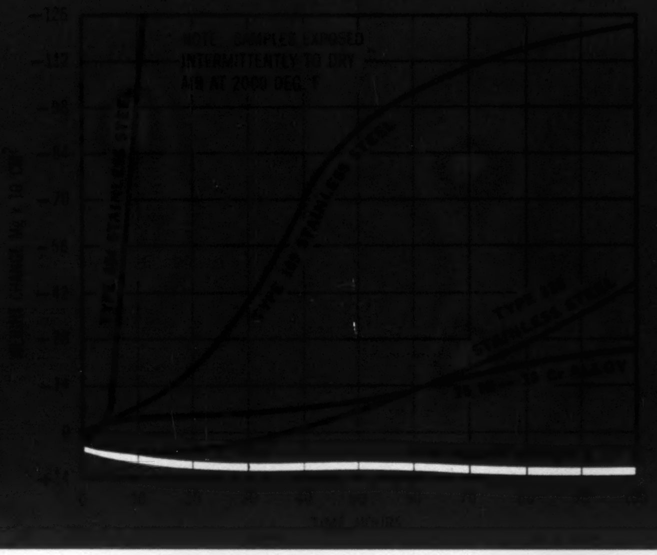
Strong in Carburizing Atmospheres

Of several alloys tested, HASTELLOY alloy X was least affected by continued exposure to commercial carburizing compounds and petroleum coke. Chart (right) shows results of tests. Alloy X is also remarkably resistant to carbonitriding, dissociated ammonia, hydrogen, and fuel gases.

3

Strong at 1800 Deg. F

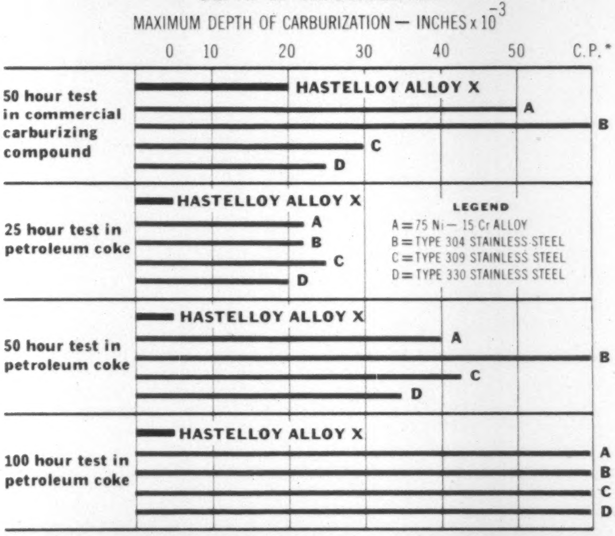
HASTELLOY alloy X has higher tensile strength than most alloys used in furnace atmospheres. This higher strength reduces the danger of warping or cracking. It has outstanding resistance, too, to thermal shock, and will stand up under repeated quenchings following heat-treatment.



AND . . .

This high strength pays dividends in long service life . . . high production rates . . . low maintenance . . . greater service all around. HASTELLOY alloy X is available in both wrought and cast forms.

DEPTH OF CARBURIZATION



* Completely penetrated specimen cross section

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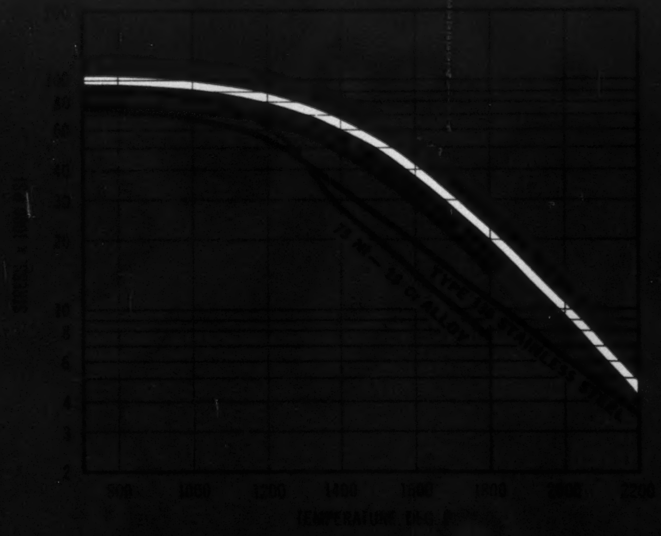

☐ Please send me the 20 page booklet describing successful uses of HASTELLOY alloy X in Heat-Treating.

☐ Please send me the 28 page booklet describing the properties of HASTELLOY alloy X.

Name ____________________ Title ____________

Company ______________________________

Address ______________________________

City ____________ Zone ____________ State ____________

HASTELLOY ALLOY X SOLVED THESE TOUGH PROBLEMS

[illegible] 2250°F for [illegible] Years. Hearth plates made of HASTELLOY alloy X are used in electric furnaces where annealing temperatures reach 2250 deg. F.

Resists Carburization for 16000 Hours Plus supporting 80 lb. of transmission parts during 7 to 9 hour cycle followed by oil quench. Trays are still in service.

[illegible] Deg. F. Plus Heavy Load Without Warping after 16,600 cycles in oxidizing atmosphere. Other materials failed after only a few firing cycles.

Thermal Shock, [illegible]°F, Flame Impingement, Oxidation, and Corrosion from Natural Gases were all successfully resisted by this thin-walled retort used in brazing.

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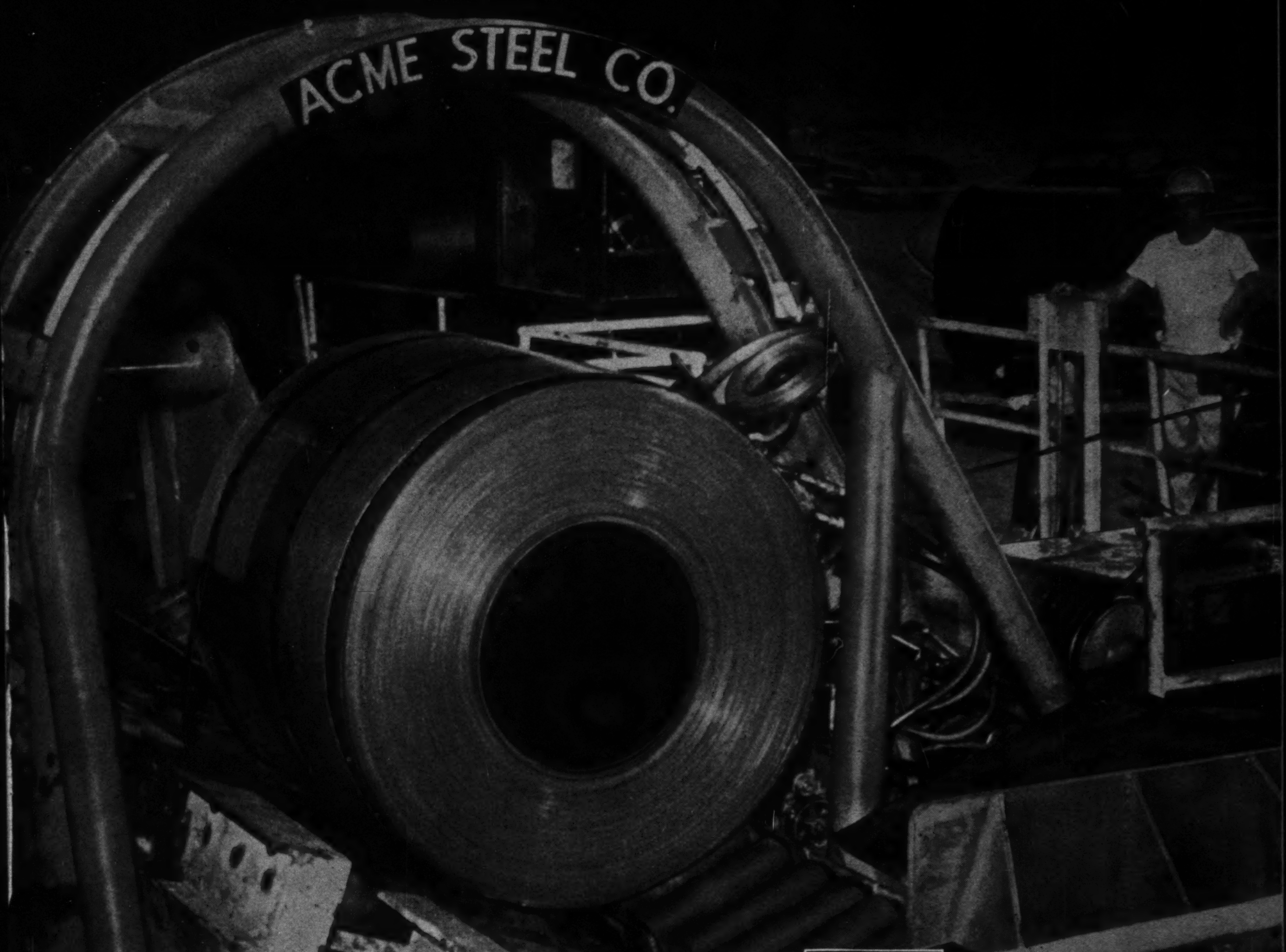
STRAPS SIZZLING COILS BY REMOTE CONTROL!



Acme Idea Man William Whyte helped develop Idea No. U8-1, at Dominion Foundries and Steel, Ltd., Hamilton, Ont.

One of Canada's leading basic steel producers keeps in step with increased coil-making capacity with a first-of-its-kind tying method engineered by Acme Steel—the F5 Strapping Machine.

This new innovation is customized into a push-button automatic, remote controlled strapping station. It ties 5 to 14 ton hot coils in 12 seconds! Operation is simple and safe. Strapping is applied, tightened to uniform tension, sealed and cut—all by one push-button.

We've prepared a colorful 12-minute sound film of this entire operation for group showing. For arrangements, write on your letterhead to Acme Steel.

ACME STEEL IDEA LEADER IN **STRAPPING**

ACME STEEL COMPANY
Acme Steel Products Division
Dept. IF-90
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Chicago 27, Ill.

Please send me Idea No. U8-1 and examples of how major companies in my field use Acme Steel Strapping.

Name ________________

Title ________________

Firm ________________

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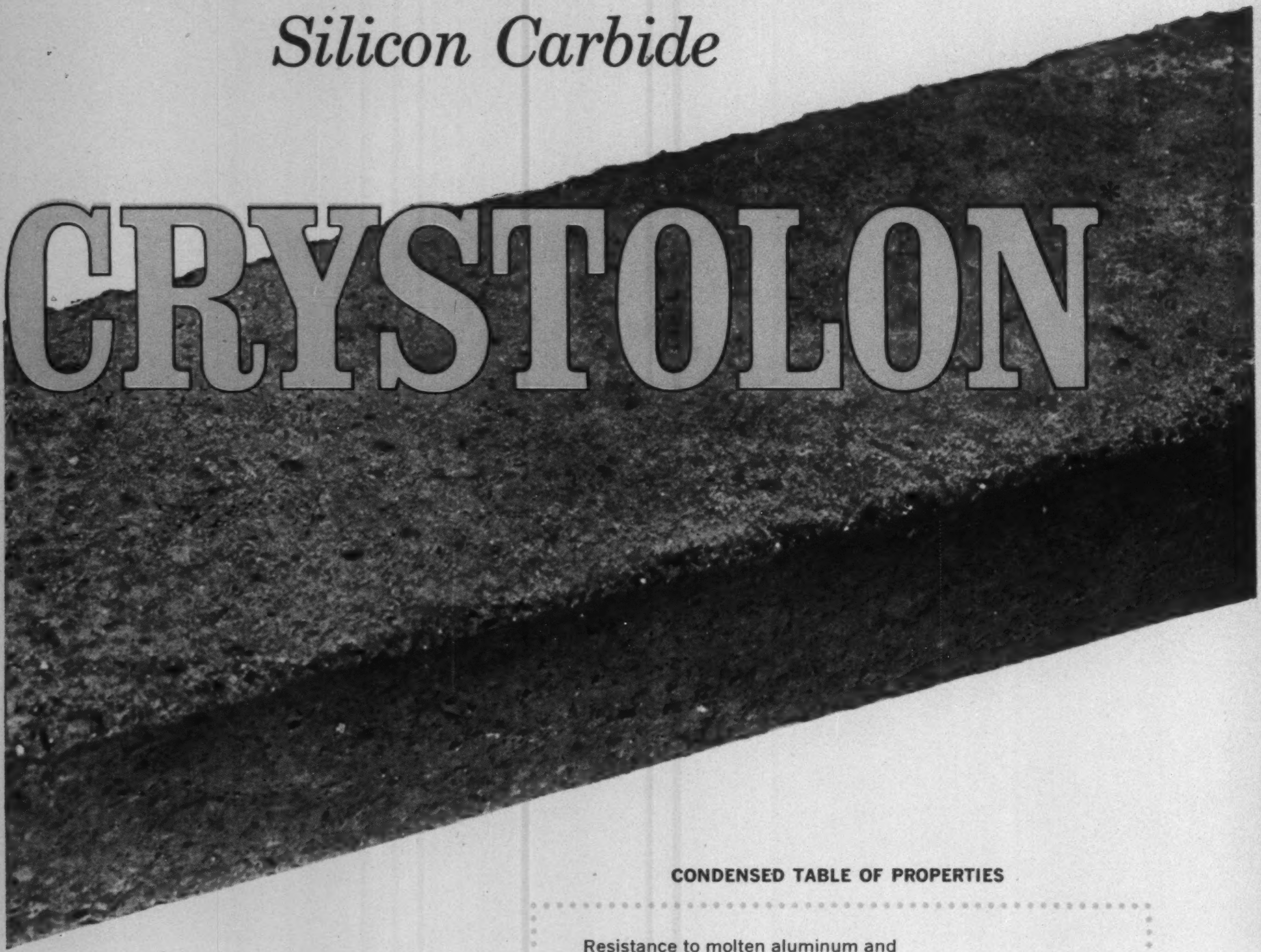
Now . . . use Nitride-Bonded Silicon Carbide

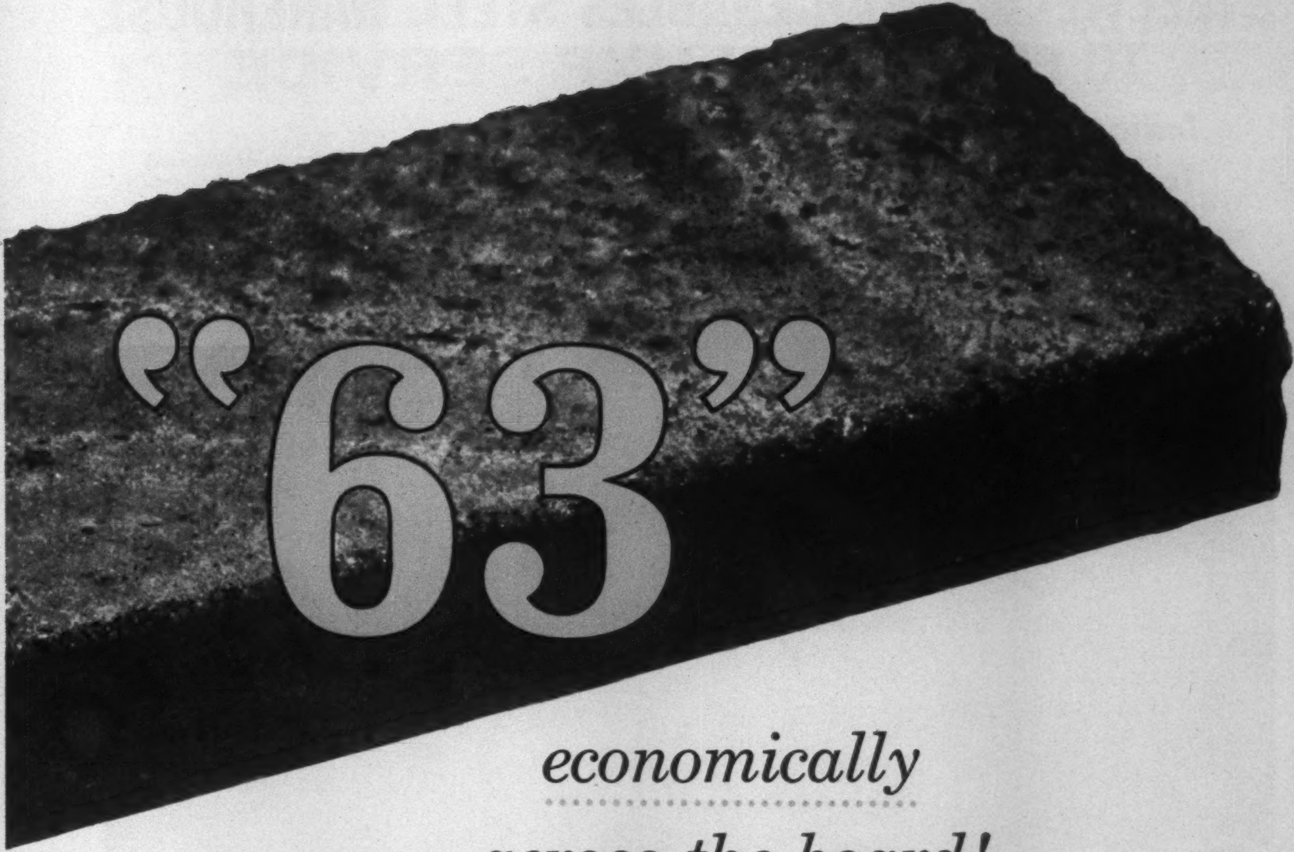


CONDENSED TABLE OF PROPERTIES

Resistance to molten aluminum and molten cryolite at 1000°C	Excellent
Fired Density	2.60 g/c.c.
Wear Resistance	Excellent
Oxidation Resistance	Excellent
Modulus of Rupture	
Room Temperature	6400 p.s.i.
1250°C	7000 p.s.i.
1450°C	3800 p.s.i.

Test procedures available on request.

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes



"63"

economically ...across the board!

Now, the best-performing silicon carbide refractory is available at a realistic price! Brand-new CRYSTOLON "63" permits the use of a cost-saving nitride-bonded silicon carbide refractory for hundreds of applications.

Produced by an exclusive Norton process, CRYSTOLON "63" Silicon Carbide provides all the superior properties of nitride-bonded silicon carbide at a *new low cost!* It has high thermal conductivity, excellent heat shock and wear resistance, and good resistance to most corrosive liquids. In extensive tests, it not only showed excellent resistance to "wetting" by molten non-ferrous metals (aluminum, magnesium, zinc, lead and others) but also to fused salts, such as cryolite!

Use CRYSTOLON "63" refractories for all the *tough* jobs: aluminum reduction cell linings, non-ferrous melting furnace refractories, metal transfer systems, slag hole blocks, chemical reactor linings, high strength kiln furniture, incinerator linings and for handling corrosive salts. *Send for complete details and properties — and let us quote on your requirements.* Write NORTON COMPANY, Refractories Division, 208 New Bond Street, Worcester 6, Massachusetts.

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

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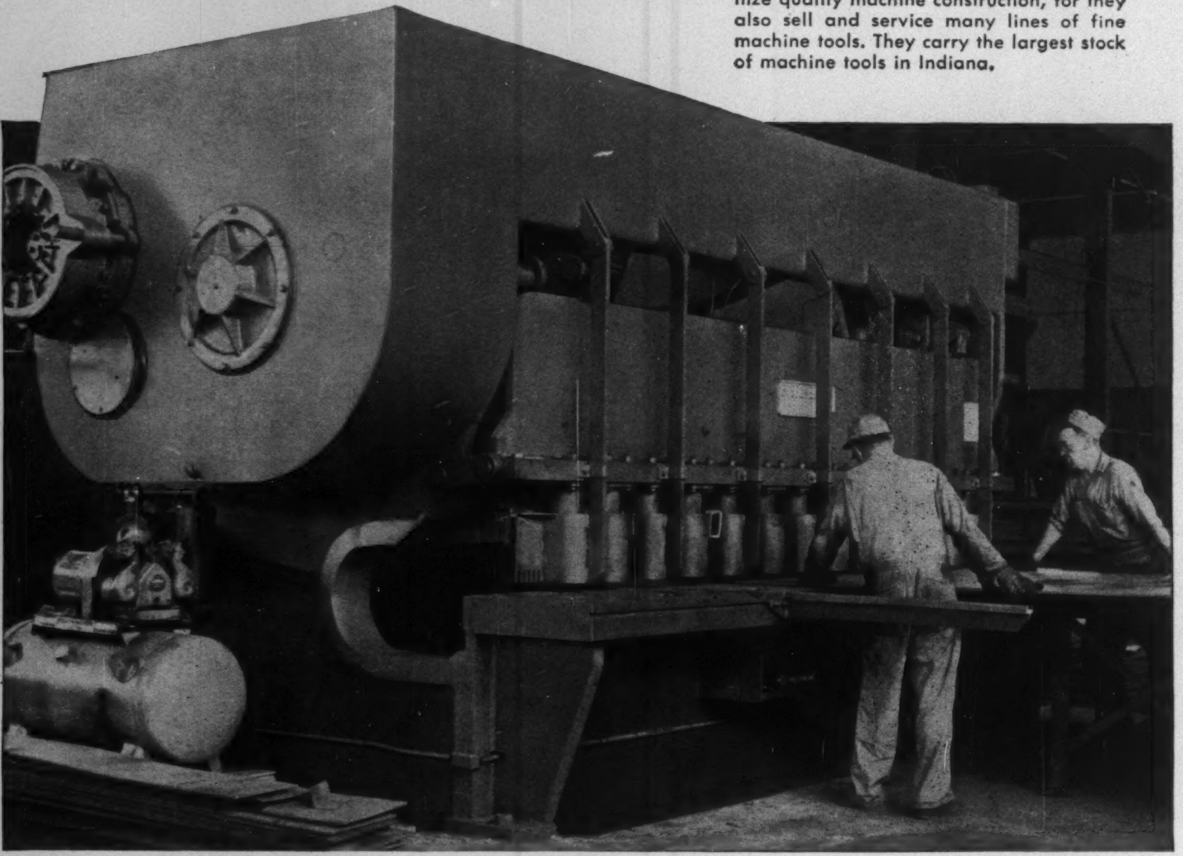
REFRACTORIES
Engineered... R̸x ...Prescribed
75 years of
Making better products
...to make your products better

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners

STEELWELD SHEAR ENABLES STEEL WAREHOUSE TO PROVIDE DELUXE SERVICE

Indianapolis Supplier Cuts Plates To Suit Customers' Needs EXACTLY

This Steelweld Shear is much appreciated at the Indianapolis Machinery Co., Inc. And they should be in a position to recognize quality machine construction, for they also sell and service many lines of fine machine tools. They carry the largest stock of machine tools in Indiana.



WITH a Steelweld Pivoted-Blade Shear that has been operated continuously in its steel warehouse since 1953, the Indianapolis Machinery Co., Inc., Indianapolis, furnishes metal cut to exactly meet its customers' requirements.

This usually means thicknesses from 3/16 to ¾ inch, widths varying from a few inches to 12 feet and lengths to the maximum available from the mills. The metal may be mild steel, stainless or any of a number of special alloys. Whatever the metal or thickness, the cuts are straight and accurate with negligible burr, because the knife clearance is always adjusted to produce the best results.

Some orders call for strips of type 304 stainless, 5/16 and ⅜ inch thick by 1¾ and 2¾ inch wide. Others call for hard abrasive-resisting steel in strips ⅜ by 2 and 2¼ inches. Because of the shear's very low knife rake angle, such items are made with extremely little twist, camber and bow.

The air-operated clutch and brake have proven phenomenal by customary shear standards. Despite the tens of thousands of times the clutch and brake have opened and closed in making as many cuts over the years, the original linings are still in use. The action continues snappy and positive. The machine has its own air compressor mounted on one end.

Considering the large volume of shearing work done, the knife wear has been long and satisfactory. Knife grindings have been at least a year or more apart. This is attributed to not only the quality of the knives, but to the low rake at which they operate and also the correct knife clearance used for all cutting.

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STEELWELD
PIVOTED BLADE **SHEARS**

Steelweld Machinery includes: Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4862 E. 282 ST. • WICKLIFFE, OHIO

PRICE PLANS OF STEEL MILLS may be indicated in the next month. The mills must notify tinplate users of any price increase 35 days before the change takes effect. If a hike is to be made Dec. 1, when steel wages go up, tinplate customers will have to be given notice before the end of October. Market conditions and election considerations make early action doubtful.

COMPACTS HIT AUTO COMPANY SUPPLIERS due to less material requirements of the smaller cars. Automakers say that eventually compacts will mean "plus" sales for suppliers as a result of an expanding auto market of 7 to 8 million cars annually. (P. 61.)

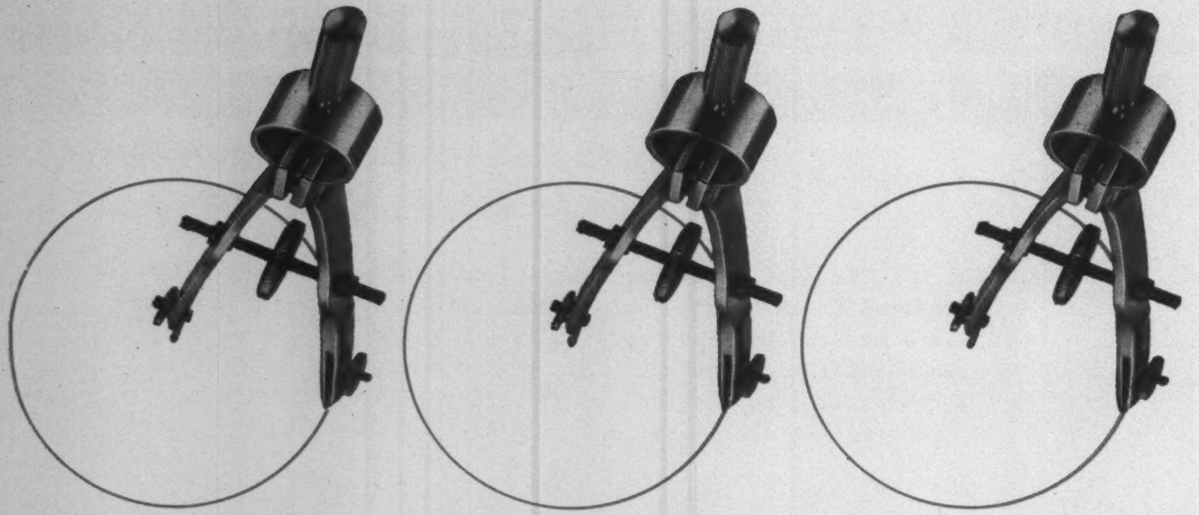
APPLICATIONS OF COLD EXTRUSION to both aluminum and steel parts are exciting new interests. Tooling service by a major press manufacturer, along with specially designed presses for high production, are sparking the trend. Other press makers are expected to follow suit.

MARKETERS MUST STUDY INVENTORY DATA with special care, according to R. S. Eckley, Caterpillar Tractor Co. economist. He warns of a "double-barrel" effect on inventories when customer sales decline. A long draw is made on stocks to get the inventory-sales ratio in line. And this downward inventory adjustment is stepped up as sales fall further.

SALES AND PROFITS OF U. S. MANUFACTURERS showed improvement in the second quarter of this year over the first. Profits after taxes for the June quarter, however, were down 16 pct compared with the record quarter last year. Included in industries showing profit declines of 25 pct or more: Metalworking machinery, fabricated metal products and iron and steel.

DIECASTERS PREDICT A FOURTH QUARTER UPSURGE that should carry 1960 total production above last year. Members of the American Die Casting Institute estimate that 1960 total zinc diecasting production may reach 335,000 tons, up 10,000 tons over 1959. Aluminum castings are expected to jump 12 million pounds to 387 million pounds.

INVENTORY OF NEW CARS declined during August. The count was 890,000 as of September 1, about 175,000 less than the total a month earlier. This is 40,000 above the expected level.



POSITIVE DUPLICATION–EVERY TIME!

As surely as a drawing compass can produce identical circles, you can be sure of getting Positive Duplication with these CINCINNATI CENTERLESS GRINDING WHEELS—and with *all* CINCINNATI WHEELS.

This predictable uniformity is the result of Cincinnati's unique 36-step (PD)° manufacturing process. These rigid controls achieve tolerances for wheel inside diameters which are the "tightest" in the industry. Your (PD) WHEELS have better balance, require less dressing and last longer.

"PD" PAYS OFF FOR YOU

You can meet or beat demanding production schedules with the help of Positive Duplication, because you can reorder a CINCINNATI (PD) WHEEL and know that it will act and grind exactly like the original.

Whatever shape, grade and size you specify . . . centertype, centerless, internal, surface, toolroom or snagging wheel . . . you get Positive Duplication—Every Time!

CUT COSTS . . . CALL CINCINNATI

Cincinnati factory representatives are trained specialists, experienced in grinding job set-ups and operations. Their skills are at your service. Just call your CINCINNATI (PD) GRINDING WHEELS Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

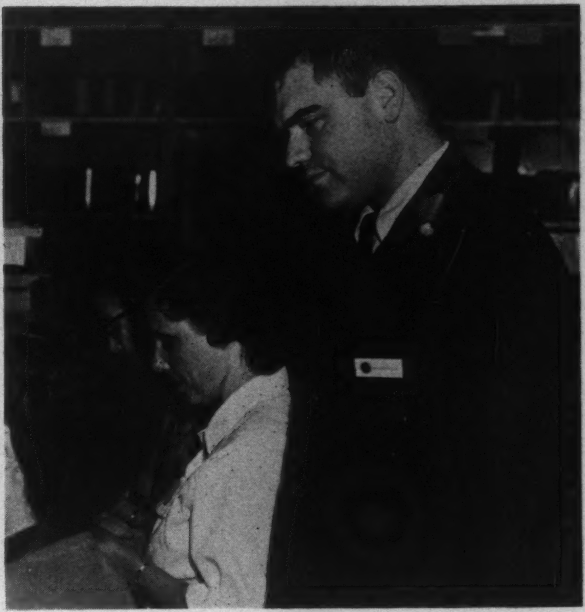
(PD) POSITIVE DUPLICATION

CINCINNATI°
GRINDING WHEELS

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U.S. Pat Off.

CITIZENS' BAND: Industry is showing great interest in two-way radio system for short-range, in-plant calls.



POCKET RECEIVER: Handy radio receiver can be worn in pocket. Horn speaker provides audio.

Mobile Radio Sales Skyrocket For Office and Plant Use

With more companies installing industrial radio systems, equipment makers are scrambling to meet demand.

One popular system: A citizens' band frequency for short-range, low cost operation.—By K. W. Bennett.

- Business and industrial radio systems are becoming big business. In a year when many businesses are slow, sales of mobile radio equipment are booming. And the market's potential is even more promising.

Radio equipment makers are scrambling to fill orders as U. S. industrial and commercial companies buy their own broadcasting stations. Sales of mobile radio equipment will increase 20 pct this year.

Going Up—It's estimated that about $84 million worth of privately owned broadcast equipment was sold in 1959. This year the total will probably hit $110 million and might reach $120 million.

In what ways can a radio network save a manufacturer money?

How Radio Pays—In warehousing operations it's been established that five radio-dispatched fork trucks can do the work of six fork trucks dispatched from a control office. Time saved makes the difference.

A scavenger firm cut the daily mileage of its collection trucks, servicing 450 Dempster-type containers, by 20 pct. An air freight forwarder feels he'd need twice the number of trucks and drivers currently used, if he didn't control his trucks by radio.

A 20-vehicle maintenance force has boosted output by 15 pct, using radio. A Chicago precision parts maker, with radio, has cut 150 miles a day from his die delivery and pickup system. A fuel oil distributor points to a $1000 annual saving in telephone costs alone.

Rush for Equipment—An Esso refinery operates 97 radio-dispatched vehicles in a single refinery area. Adolph Plating Co., midwest electroplater, radio dispatches 15 trucks and sales cars that pick up parts and orders in the Chicago

CALLING ALL CARS: Table-model, two-way radio fits easily on desktop. It can reach vehicles many miles away, including cars or trucks on the road, portable sets, or shirt-pocket radios.

area. A building materials firm maintains 16 "base stations," which radios orders to 360 vehicles, all in a five-county area.

The big manufacturers of industrial radio equipment are expanding to meet the rush for increased radio contact. Radio Corporation of America is building a new plant at Washington, Pa., for increased production of small two-way radio units.

General Electric, second of the big three in mobile equipment manufacture, moved its mobile equipment facilities from Schenectady, N. Y., to Lynchburg, Va., last year to get more manufacturing space. This year, the firm is enlarging the Lynchburg facilities.

Motorola, believed to be the biggest of the mobile equipment manufacturers, has underway a $10 million expansion program, which includes stepping up mobile radio equipment.

Three-Fold Upsurge?—In 1949, there were about 36,000 "mobile" transceivers in operation in the U. S. Last year the figure hit about 1,200,000 units. Market researchers for one of the big three radio builders in the field see a three-fold expansion in yearly sales in the next decade. This applies to transceivers in commercial and industrial use operating in the standard frequencies.

Citizens' Band—Since the advent of the new "citizens' band" frequencies, announced in June, 1959, an entire new area in radio communications is opening to industrial or commercial firms. "Citizens' band" licenses are easy to get. The stations needn't be operated by a licensed operator. And the original cost of the equipment is about half that of the previously available equipment.

A standard private broadcasting unit will cost $650-$700 per vehicle equipped with a transciever, say a fork lift truck or a cartage truck. A base station can go as low as $4,000, and up to $15,000. These sets can broadcast and receive signals up to as much as 120 miles, and deliver a clear, noise-free signal.

A citizens' band transceiver has a range of 10 miles or less, may cost as little as $60 and goes to a top of not much over $300. Sikorsky Aircraft Div. has 18 sets on lift trucks at one plant. Minneapolis-Honeywell Regulator Co., International-Harvester Co., American Can Co., Webcor, Inc., have already moved into the use of citizens' band radio.

Sales Prediction—Biggest of the citizens' band transceiver builders is E. P. Johnson Co., Waseca, Minn. General Sales Manager E. T. Herbig, Jr., told The IRON AGE, "citizens' band radio has boosted our sales heavily already and we see further gains in 1961. We're finishing a $1 million plant to handle the new business." His prediction: From a standing start in June of 1959, when the citizens' band was created, sales will hit 100-150,000 sets this year, and should exceed 200,000 sets in 1961.

He estimates that 85 pct of current production is being sold to industrial and commercial firms who use radio to speed up materials handling or process control.

Super-Small Transceiver—Within months, E. F. Johnson Co., will begin marketing a super-small transceiver that weighs less than 1 lb, has a 1-3 mile range, and will market at $125-150 per unit. Though designed for industrial and commercial use, no one cares to even guess at the sales potential, if consumers become interested — as they did with tape recorders.

Of at least 60 manufacturers who have produced citizens' band radio transceivers, Johnson, Hallicrafter, Citiphone appear to be leading the field in sales. Allied Radio, major U. S. electronics parts distributor, reports it is marketing a dis-assembled "kit" transceiver. Economy minded companies are snapping these up, to build their own short-range radio networks.

Marketers of citizens' band radio say they sell most heavily in models at $60 retail and $125-150. The claim: They can actually put their equipment into a plant at 25 pct the cost of a conventional two-way radio system, since installation costs are much lower.

How Do Compacts Hit Suppliers?

Steel is the big loser in comparison of materials used in compacts with standard models.

Everyone hopes for a long-range "plus," but wonders if and when.—By A. E. Fleming.

▪ With every month that passes, compact cars account for a greater part of domestic automobile production.

1960 compacts, Chevrolet Corvair, Ford Falcon, Mercury Comet, and Plymouth Valiant, alone took 18 pct of U. S. auto output in the first eight months of 1960. The percentage will grow as more compacts arrive this fall—the Buick Special, Oldmobile F-85, Pontiac Tempest and Dodge Lancer.

Eventually a Plus—To suppliers, compact cars mean smaller amounts of their products will be sold for automotive use.

Auto makers themselves predict that eventually compacts will mean "plus" sales for them. They say the "plus" sales will result in an expanding auto market of 7 to 8 million cars sales annually. This means greater tonnages of all the things it takes to make a car. But "plus" sales aren't apparent in a 6 million car year like 1960. And predictions so far are that 1961 will be about the same as this year.

Comparative Figures — While auto suppliers wait for the "plus" sales years to arrive, exactly how much less of their materials will they be selling to auto makers because of a rising compact market? To answer this question, The IRON AGE matches three 1960 model Chrysler Corp. cars, a compact Valiant, and regular size Plymouths and Darts.

The Valiant is a V-100 model with 6-cylinder engine, manual transmission, steering and brakes. The Plymouth is a Fury model with V-8 engine, automatic transmission, power steering and manual brakes. The Dart has the same equipment as the Fury.

Steel Loses Most—Valiant and Plymouth require the same portions of only two materials, lead and rubber. Rubber in this case doesn't include the five tires, but comprises such items as grommets, molding and miscellaneous parts.

The smaller Valiant needs less of all other substances. Iron and steel absorb most of the loss in poundage. Plain carbon steel is the biggest loser. Valiant uses 657.3 lb less than Plymouth and 680.3 lb less than Dart.

The Figures—Other losses (See table) in matching Valiant against Plymouth are 106.8 lb of alloy steel, 104.5 lb of plain cast iron, 56.2 lb of alloy cast iron, and 38.9 lb of glass fiber and materials in the five tires.

In the first eight months of this year Valiant production totaled 181,478 units. Looking at it theoretically, if there were no Valiants and the 181,478 cars had been Plymouths instead, the additional materials required would have amounted to 120.2 million lb of plain carbon steel, 19.3 million lb of alloy steel, 18.9 million lb of plain cast iron, 10.1 million lb of alloy cast iron, 7.0 million lb of paper, glass fiber and material in five tires.

What Goes Into New Cars

Material in Lbs.	Plymouth Fury	Dart V-8	Valiant V-100
Plain Cast Iron	370.5	370.5	266.0
Alloy Cast Iron	195.2	195.2	139.0
Malleable Iron	81.3	81.3	69.0
Plain Carbon Steel	2238.1	2261.1	1580.8
Alloy Steel	212.3	212.3	105.5
Aluminum	68.0	70.0	65.0
Zinc	44.0	44.0	16.7
Copper, Brass and Bronze	45.3	45.3	32.0
Lead	29.1	29.1	29.1
Glass	106.6	106.6	80.6
Rubber (other than tires)	67.7	67.7	67.7
Pads and Cloth Material	33.7	33.7	24.3
Others	144.2	144.2	105.3

If You Want to Advance You'll Need a Plan

By **Dr. F. J. Gaudet**—Director, Laboratory of Psychological Studies, Stevens Inst. of Technology

Piling up college credits and gaining more job experience is not necessarily the way to prepare for a management job.

Special skills must be developed to get and hold that top management job.

▪ "Education has become the royal road to positions of power in American business and industry," say Warner and Abegglen in their book, Big Business Leaders in America.

This is true—to a certain extent.

Education and Management—Education, of course, gives the individual something salable so that he usually enters a company at a higher level than the man without this preparation. Obviously, too, in certain departments of a company (particularly technical or other specialized units), increased knowledge will help start a man up the management ladder. But in other departments, and above a certain level even in the specialized departments, quite different skills are required for the successful handling of management jobs.

The first implication of the Stevens studies is that, in general, the factors that prevent a man from successfully handling a management job are not skills which can be learned in colleges. In other words, the road to a top management position is not paved with more and more courses. No course, or series of courses, can teach a man to accept responsibility, to delegate authority properly, or cooperate with others. And these are skills which he **must** have to be a successful management man.

Over - Specialization — On the other hand—and this is not as contradictory as it seems at first—the one single factor which was cited as a cause of failure at the executive level more frequently than any other single factor was "lack of breadth of knowledge." This, spelled out, means over-specialization. The men who fail because they lack breadth of knowledge (were over-specialized) are mainly engineers, lawyers, accountants, statisticians, and the like.

Branch Out—If you are an engineer, more courses in engineering will certainly make you a more knowledgeable engineer. Your boss, being human, wants this for the good of his own department. But even though you are a more knowledgeable engineer, you perhaps cannot read your own company's balance sheets, nor do you know anything about marketing, or advertising, and so on. And as for labor relations, you are probably more irritated than enlightened in that area. Sound basic knowledge in all these fields is a "must" for the management man who intends to go to the top and stay there.

Courses That Aid—Among the single factors which were given as causes of executive failure in the Stevens studies were two which can partially be taken care of through specific courses.

Lack of knowledge of personnel organization and administration is fairly easily remedied. But the man who is pretty well up the totem pole in this specialty should probably be wondering about his **breadth** of knowledge.

So far as "inability to judge

How Interests Decide Your Career

Many men go into management jobs without the basic interest in working with people necessary for success. Here's a simple test frequently used to help people see where their own interests lie.

Draw three overlapping circles, each circle representing (by its size) your interest in Ideas, People or Things (figures, machinery, etc.). Below, are the circles two different individuals might have drawn.

Obviously, A and B are quite different types of people. To the extent that they have abilities and knowledge equal with their interests, they probably will be successful at entirely different jobs.

A would not be happy and probably not successful in a management job. He would be much better placed as a mechanical engineer, a tool maker, or a machinist.

B, on the other hand, would not be suited for any of these occupations. He might be a good salesman.

Try this test on yourself. Then have several of your friends who know you well draw the circles as they see your interests. If your friends disagree with your evaluation of yourself—you should ask yourself some serious questions.

people" is concerned, this appears to be an area where a course, or courses, in personnel selection, interviewing, and the like, might be a good investment against failure. The trouble is that most of these courses are too elementary and serve only to introduce the student to the subject.

But, as has been mentioned in previous articles, these knowledge lacks are of far less significance in holding a man back than are the so-called "personality" lacks.

Management Skills — Can such skills be learned? In some cases, the answer is "no." The man who is more interested in "things" or in "ideas" than he is in "people" will probably never be able to improve his management skills to any extent.

On the other hand, some individuals clearly can learn these skills, else we would have no successful executives at all. How do they learn? Probably the most common way is by experience.

People have a number of misconceptions about this idea of learning by experience. Perhaps the most widely held misconception is that all an individual needs, in order to improve, is practice or experience.

But how true is this? How much has your handwriting improved as a result of the practice you have had in the last ten years? Are you a better automobile driver than you were ten years ago? If you have more than five years' experience in a particular management job, how much improvement have you made in, say, the last two years?

Motivation Needed—The point is that practice or experience **alone** brings about no improvement. There must be present, a **need, wish** or **desire** to improve before any real learning takes place. In addition, for truly efficient learning or improvement, there should be some way for the learner to become acquainted with a better way of behaving. This usually means a teacher or a coach.

Community Leadership — For those men who hope to develop leadership skills by participating in community activities and professional organizations, it is probably unnecessary to point out that membership alone will not do the trick. Real learning will take place only when a man gets himself elected or appointed to a position where, if he is to do a good job, he must learn to judge people, to assume responsibility, to plan and schedule, and all the rest.

Furthermore, demonstrated leadership in a community organization helps to make the aspiring management man **visible.** "Visibility" is extremely important in getting ahead. The man who wants to win, place or show in the management race has to be seen by his bosses—seen physically, seen in terms of doing an outstanding job, seen as the man who is called upon in an emergency, or seen as a leader in his community.

Changing Companies — For the man who hopes to advance himself by changing companies, a well-planned program of job-hunting is of the greatest importance. Strangely enough, most studies of job-hunting techniques show that the vast majority of job-hunters start out either with no real program at all or with techniques which are designed only for the purpose of getting them interviews. Before you send your letter or your resume to any company, you should make a thorough investigation of the factors that govern advancement in that company.

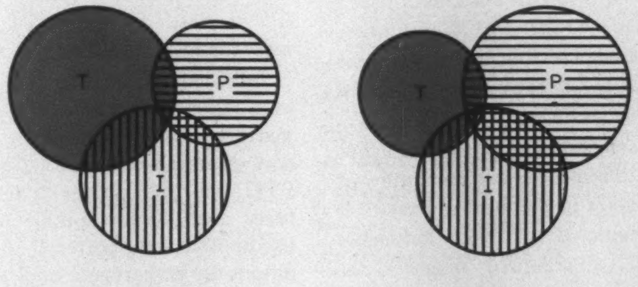
Final Part Of This Series

This is the last article of Dr. Gaudet's three-part series on executive success.

In the first two articles, Dr. Gaudet took a hard look at causes of executive failure and suggested a plan of self-appraisal for aspiring executives.

For example, education is one of the factors that may or may not stand in the way of your promotion in an organization. Some companies almost never promote men to management positions if they lack a college degree; other companies do. If you are the holder of a college degree, you should look into the kind of degree which is held by the men who are usually promoted.

Finally, in job-hunting, do not rely on obtaining information about opportunities for advancement in the company from the person who interviews you. If the interviewer is anxious to get you for his company he may, out of loyalty to his company, not deliberately lie to you, but be a little vague in his answers to your questions.



A's Pattern

B's Pattern

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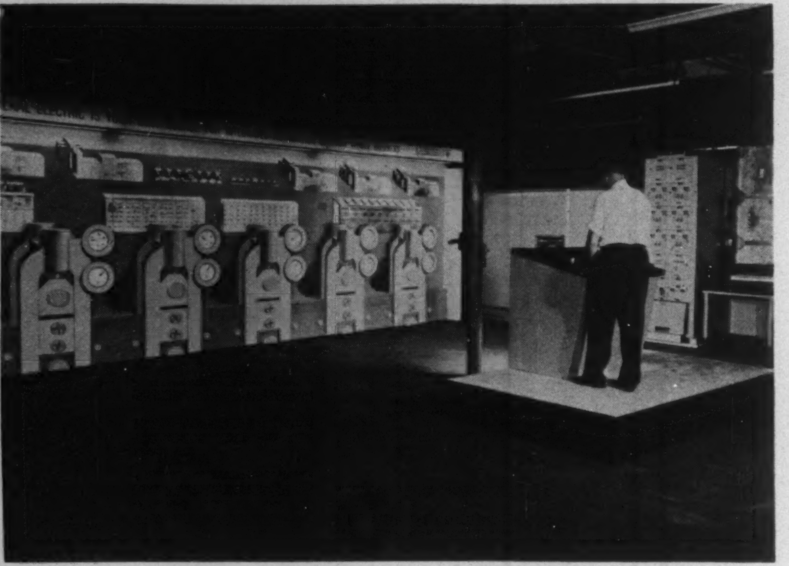


READY TO ROLL: The General Electric Co. exhibit at the Iron and Steel Show features a working simulation of a GE-312 computer-controlled hot strip mill. The operator actually "rolls" his own steel strip.

GE Links Automation To Steel Production

Automatic screwdown controls on continuous hot-rolled sheet mills can pay for themselves in two years, according to General Electric engineers. And the marriage of automation with computers will open a new punched tape era in quality control, pricing and payrolls.

At a Cleveland preview of GE's exhibit for the Iron and Steel Engineers Show, W. E. Miller, metal rolling and processing engineering manager, said that an increase of only 1 to 3 pct in the amount of prime tonnage from given lengths would easily pay the cost of installations. These vary with the mill's vintage but range from $100,000 to $700,000.

Closer Results — Another major facet, of course, is that automatic control results in the sheet staying closer to the exact center of gauge tolerance limits.

GE has made two installations of such controls. One is at U. S. Steel Corp.'s Geneva Works in Utah and another at an unidentified mill of another producer.

"In actual performance, automatic gauge control has lived up to its expected capabilities," says Mr. Miller. "Except for the first 30 ft. of strip and for the tail remaining after the strip exits from the next to the last stand, all of the coil is within 0.001 in. of desired gauge for well heated slabs and within 0.002 in. for slabs with large temperature variations due to cold furnace skids."

Within Commercial Tolerance— "With the complete automation system . . . the first coil after a thickness change can be almost completely within commercial tolerance," he notes.

"It can be within 0.001 in. in a matter of a few seconds. With such a system, the first coil of each order will be appreciably better than the third coils currently being produced on other mills."

GE engineers and sales officials are enthusiastic about the future of automation in the steel industry. It was predicted that with automatic control, a recorded magnetic or punched tape for the entire length of a coil could be made and shipped to the customer with the steel.

New Process Separates Non-magnetic Ore

A new method of pelletizing non-magnetic ores from Northern Michigan was started up last week by Cleveland Cliffs Iron Co. The hematite ore is difficult of separation because being non-magnetic, it cannot be separated by the magnetic process. At the New Humboldt mine pelletizing plant, jointly owned by Cliffs and Ford Motor Co., it will be made magnetic by roasting in a kiln. This system was developed by Allis-Chalmers based on cement kiln practice and has been engineered and installed by Arthur G. McKee Co., Cleveland.

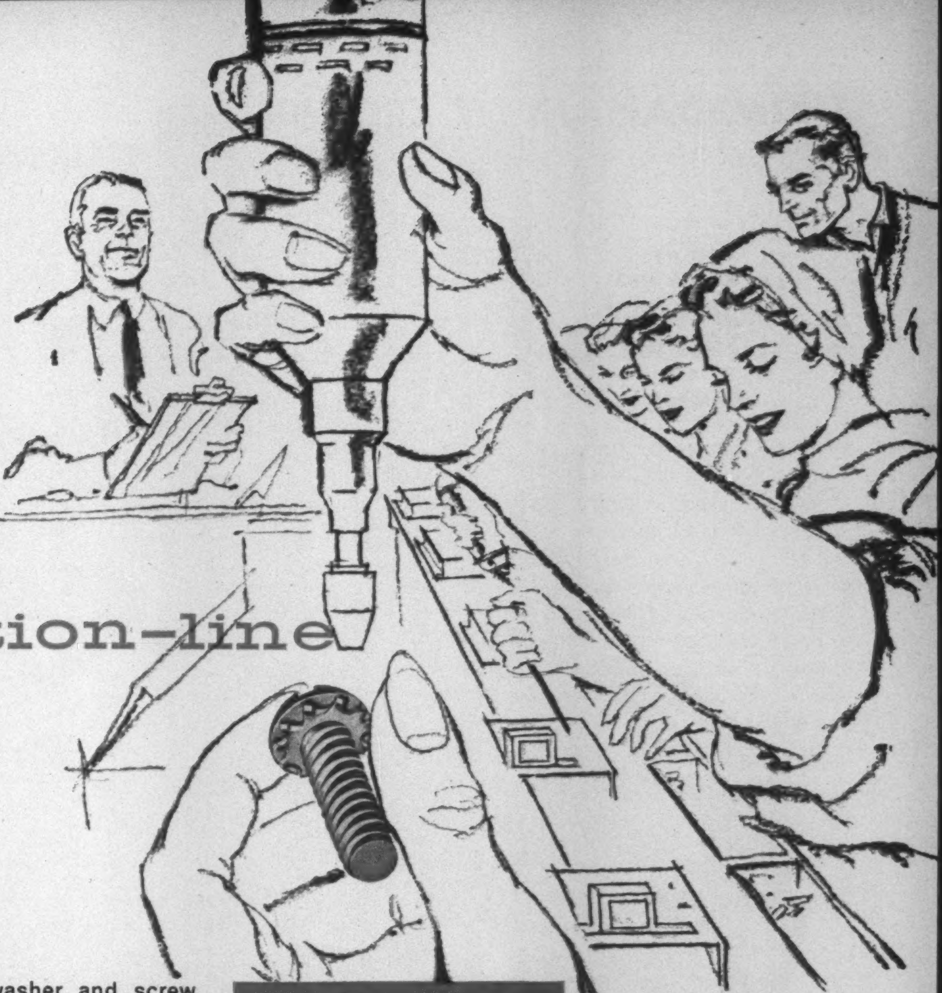
"This development of a high iron content ore from the vast low grade reserves of the Lake Superior region, which is in strong demand by the steel industry, offers the prospects of economic rebirth for the area," said Walter Sterling, Cliffs' chairman, at opening ceremonies. "This is an attempt to answer the competition of rapidly increasing importation of high-quality, low-cost ores from overseas which have made former standard grade ores unsaleable."

Reynolds to Expand

An expansion and modernization program costing more than $1 million has been announced by Reynolds Metals Co. It involves the company's plastic division facilities in Grottoes, Va.

The program is designed to increase the capacity of the Grottoes plant for production of "Reynolon" oriented polyvinyl chloride (PVC) and water-soluble polyvinyl alcohol (PVA) plastic films, which are gaining wide use in packaging.

Included in the program are the installation of two new band-casting machines for PVA production; one new orienting machine which gives PVC film the proper gauge and other qualities for specific packaging applications; corresponding additions to power and boiler facilities; and modernization of existing equipment to improve product quality and increase output.



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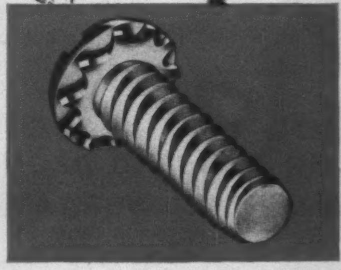

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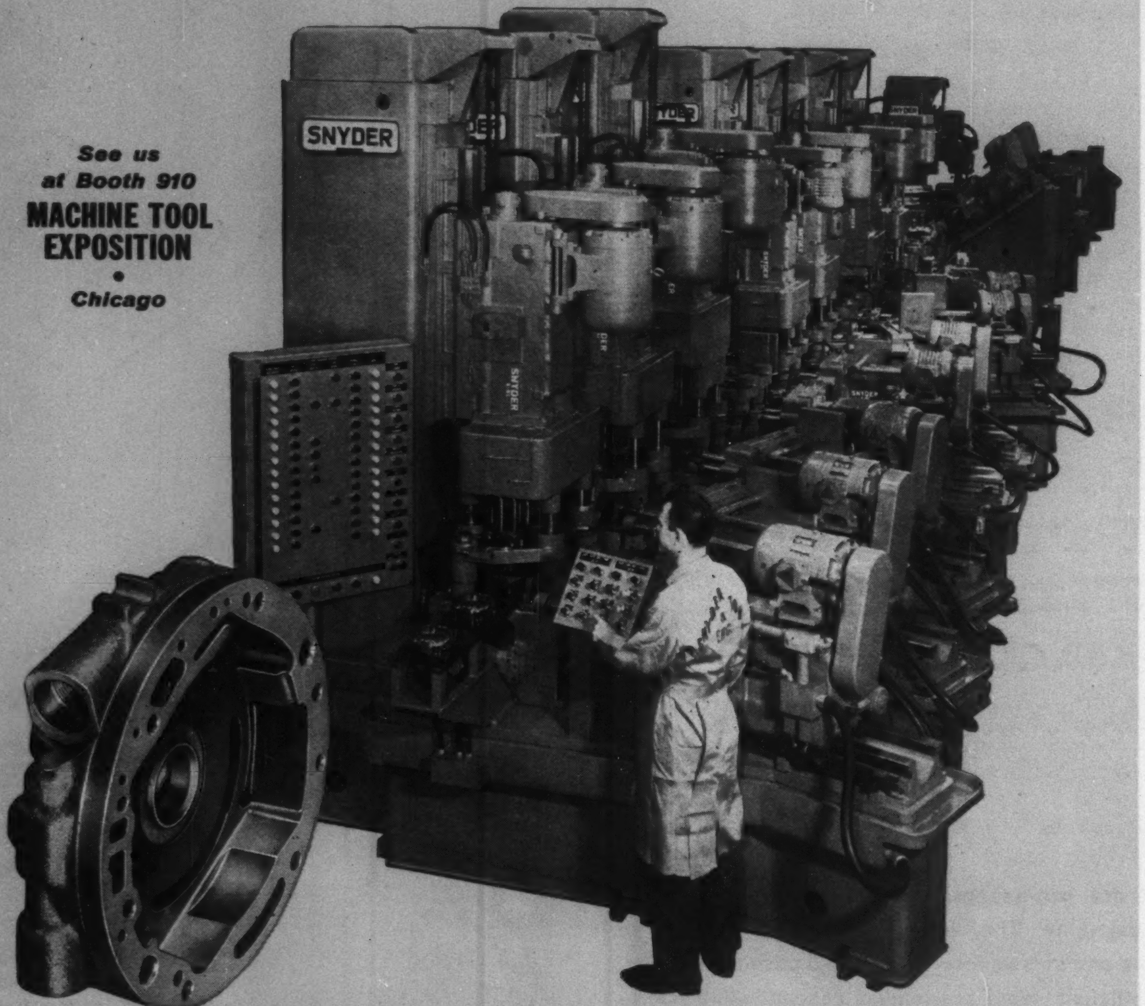

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What Worries Executives Most

High on the list of management worries are lower profits, increasing costs, and greater competition.

But, despite some disappointment about this year's sales, top executives are still confident about the future.

▪ What are businessmen most worried about?

According to a recent survey, their principal concerns are these: Rising costs, lower profit margins, and increasing competition, domestic and foreign.

The study was made among 87 presidents of U. S. companies by Wolf Management Engineering Co., Chicago-based business consultants. The companies included those in heavy and light industry, hard and soft goods, and defense contracting.

Almost two-thirds of those answering list lower profit margins as one of their big problems. About the same number claim they were harassed by increasing competition.

Necessary, But — One manufacturer sums it up this way: "Only the very nimble will recover the costs of new developments. Yet most companies must invest heavily in that area. This, with rising costs, will squeeze profit margins."

Another points out: "In well established old industries, the aim will be to hold the line at lower profit levels, discard unprofitable operations, and extend operations abroad." (See right.)

Looking Ahead—From the survey, it appears fear of coming competition from overseas is greater than actual present threats. Only about a fourth of the executives say foreign competition has already deeply affected profits. Another 7 pct mention imports as hurting them to some extent.

But, even among those who have suffered no real ill effects from overseas manufacturers, there is concern about the future. Many companies expect problems in the next five years.

Despite all their worries, businessmen are not selling the future short. Dissatisfaction is great about the way 1960 has turned out. But almost 70 pct of those who planned expansions this year say they are going ahead with their plans.

Moderate Expansion — On general economic trends for the coming five years, the majority look for moderate expansion, ranging from four to eight pct of the gross national product. But they expect to work hard to make this prediction come true.

A capsule comment foresees, "a series of chills and fevers for business, intense competition, greater sales at lower margins." Another manufacturer predicts, "Total consumer income will go on rising with only brief interruptions."

Disappointment with 60 — This year has been a disappointment for many manufacturers. Forty-five per cent started 1960 expecting a marked expansion in many business areas.

Asked if they were now satisfied with progress, 75 pct flatly say "no".

Should You Sell Overseas?

▪ More and more, top managers are studying the international market. And today's front office men must give thought to many questions before selling abroad.

Some of these were outlined by David J. Fitzgibbons, vice president of Sterling Drug, Inc., in an international marketing discussion during the National Industrial Conference Board Marketing Conference.

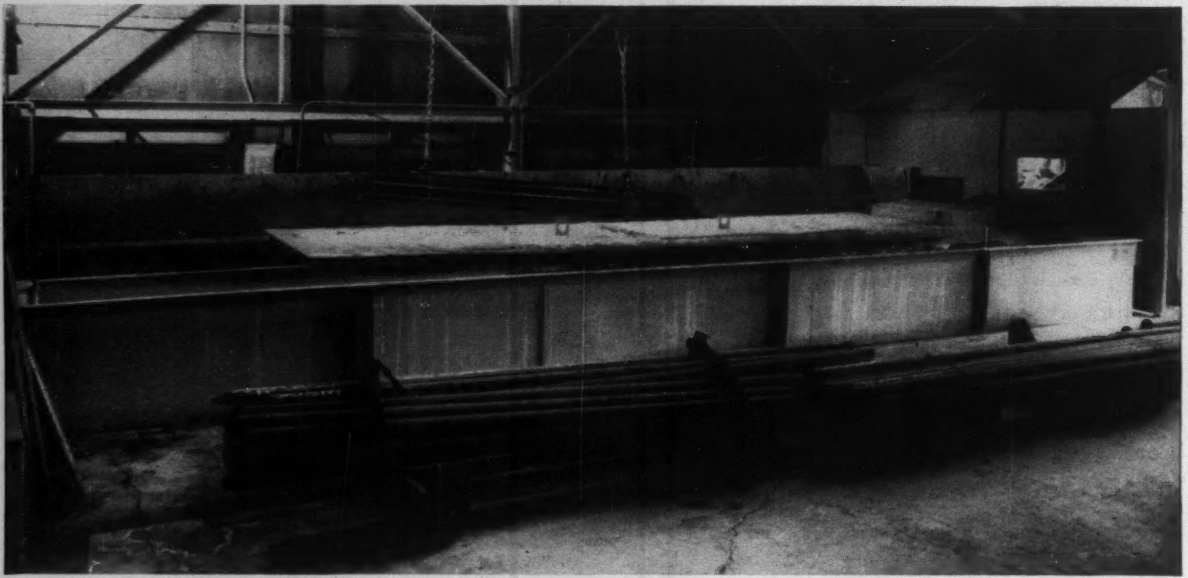
Money Comes First — Management's prime decision, he says, is financial. It must decide whether capital should or should not be invested in a given country. If the move is approved, the amount to be invested must be set. Facts to be considered before investing are: Existing competition, the product's sales potential, the political and economic atmosphere in the country involved.

Other Questions—Before a company goes overseas, additional questions must be answered. What are the regulations about local ownership? Will such ownership have a majority or minority interest in the American subsidiary?

Management must also consider questions of tariff, import quotas, exchange restrictions on profits paid from the subsidiary to the parent.

Trade opportunities are challenging, Mr. Fitzgibbons feels. He says, "the U. S. has had a remarkable growth in its foreign trade. Yet, we are only at the beginning of a new and enlightened era in international economic policy."

THE TIMKEN COMPANY CUTS DESCALING TIME



FROM 90 MINUTES TO 30 MINUTES

How Virgo® Descaling Salt gives faster, safer cleaning.

It used to take as much as ninety minutes of straight acid pickling to descale these stainless steel tubes at the Gambrinus Works of The Timken Roller Bearing Company.

Since switching to Virgo Descaling Salt, The Timken Company reports that descaling cycles have been cut down to *one-half* hour with actual acid pickling time reduced to 10 minutes. Equally important too, is the improvement in surface quality.

In the same bath, which handles bundles up to 37 feet in length, the tubes are degreased.

Get these other Virgo advantages in your descaling:

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Virgo Salt reacts only with scale. There's no loss of base metal, no pitting or etching. There's no danger of hydrogen embrittlement.

The Virgo bath is safe and simple to operate, using normal precautions. Bath temperatures run from 800 to 1250°F.

You can descale strip, sheet, bars, wire, tubes, castings, or any other form to a chemically clean surface.

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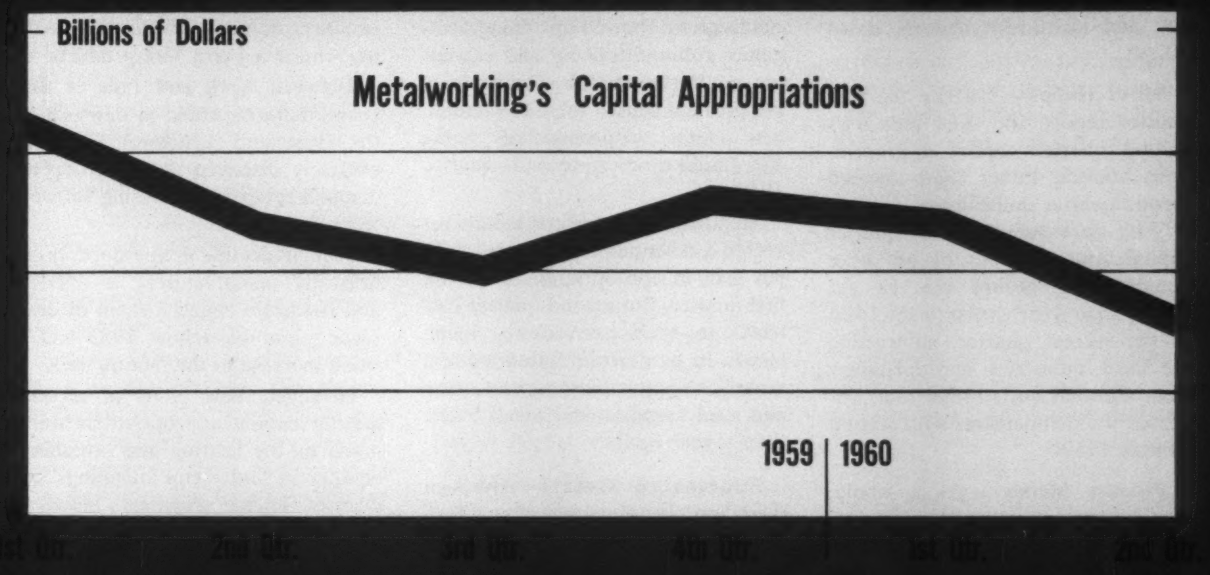

The Outlook for Capital Goods

Industry Cuts Back on New Outlays for Plants, Equipment

Metalworking industries sharply cutback new appropriations for capital goods spending in from the first to the second quarter of this year.

This means a dropoff in actual spending can be expected in the first quarter of 1961.

—By E. C. Beaudet.

▪ After a steady, 21-month rise, metalworking companies cut back plans for future plant and equipment spending in the second quarter of this year.

New capital appropriations approved during April, May and June dropped 31 pct below the first three months of 1960 and 28 pct below second-quarter 1959.

This means a decline in actual capital goods spending by metalworking plants can be expected at the end of this year and throughout the first quarter of 1961. In metalworking, capital appropriations lead expenditures anywhere from six to 12 months.

Wide Declines—Of the 38 metalworking industries reporting in this survey, only twelve report higher capital spending plans than they did in the same period a year ago. Twenty-six others have cut new capital appropriations below second quarter '59.

A breakdown of the major industry groups within metalworking shows all of them running well behind first-quarter 1960 in new appropriations approvals.

For the second quarter, primary metals producers are down 13 pct; fabricated metals, down 43 pct; nonelectrical machinery, down 57 pct; electrical machinery, down 29 pct; transportation equipment, down 35

Third of a
1960 Series:
Metalworking's
Capital
Spending Plans

THIS SURVEY conducted for The IRON AGE by The National Industrial Conference Board reports what metalworking companies set aside for future capital spending in second quarter 1960.

THIRD QUARTER spending plans will be reported in December.

pct; and instrument makers, down 10 pct.

Steel Helps—Unlike the first quarter report, the steel industry's second quarter capital appropriations boosted rather than lowered second quarter dollar totals.

With steel excluded, first quarter capital appropriations by all other metalworking groups ran 12 pct higher than year-earlier levels. But in the second quarter, subtracting the steel industry's appropriations from the total hurts rather than improves the comparisons with second quarter 1959.

Primary Metals — As a whole, new appropriations by primary metals producers once again declined in the second quarter. But the drop-off is more moderate than the first quarter because of the iron and steel industry's second-quarter decline of 25 pct compared to the first-quarter setback of 60 pct.

The brightest spot in the primary metals group showed up among companies rolling, drawing and extruding nonferrous metals. Rising market demand caused them to increase new capital appropriations some $25 million over second quarter 1959.

Smelters of nonferrous metals reversed a downtrend and scored a 23 pct gain in appropriations over the first quarter. But second-quarter cutbacks marred previously rising trends in nonferrous foundries and miscellaneous primary metals. Iron and steel foundries did much better than a year earlier.

Fabricated Metals—Although their appropriations just about topped last year's rate in the first half of 1960, the fabricated metal products industries cut approvals by 15 pct compared with second-quarter 1959.

The second quarter decline was caused chiefly by sharp cutbacks in metal cans, fabricated structural products, screw products and coating, engraving and wire products.

Between April and June of this year a faltering trend in new orders for fabricated structural products evidently discouraged this group as demand for private housing showed weakness.

A slight decline in new appropriations by manufacturers of cutlery and hardware ended a skein of dramatic gains throughout 1959 and a small increase in the first quarter.

However, new gains in second quarter capital appropriations were made by the heating and plumbing equipment and metal stampings industries. Higher shipments between the first and second quarter apparently brightened the outlook of manufacturers of heaters, stoves and plumbers' goods.

Nonelectrical Machinery — A moderate improvement in nonelectrical machinery appropriations during the first quarter of 1960 gave

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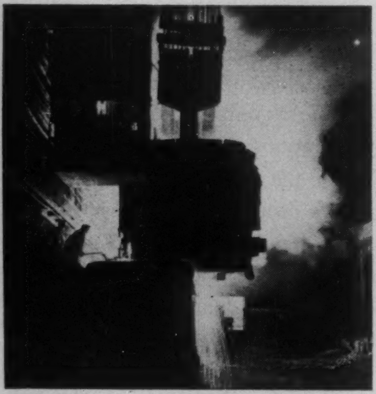
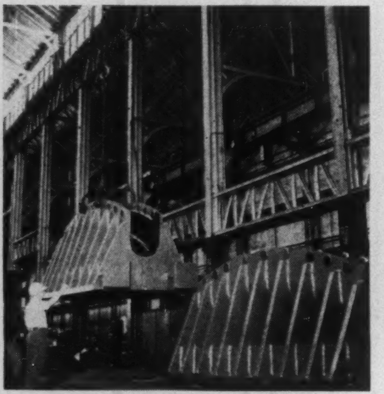
Capsule Report on Spending Plans by Major



Primary Metal Industries

Steelmakers cut new appropriations 27 pct from first to second quarter 1960.

Iron and steel foundries dropped only 10 pct, showed a gain over first half 1959. Producers of nonferrous metals made healthy increases in the second quarter.



Fabricated Metal Products

Stampers raised spending plans 55 pct in second quarter.

Other gains were posted by heating and plumbing equipment makers. But overall, makers of fabricated metal products dropped new appropriations 43 pct below first quarter 1960.

Nonelectrical Machinery

New appropriations by this group in the first half trailed first-half '59 by 15 pct.

The first to second-quarter 1960 drop was sharper, 57 pct. However, sound gains were scored by manufacturers of special machinery and office equipment.

way in the following three months to a cutback of two-fifths below year-ago set asides.

A sharp increase was scored by the special industry machinery category, reversing a slightly declining trend during the previous two quarters. A boost of one-fifth took place in the approvals of the service industry machines group, which extended its advance to four consecutive quarters.

Above average cutbacks were made in approvals by the general industrial machinery and office and computing machines groups. In each case, however, these declines were the first since the fourth quarter of 1958, and large gains marked the intervening quarters.

Farm Machinery — Once again, appropriations were reduced by manufacturers of farm machinery and equipment. This was the fourth straight cut, and is closely related to the decline in agricultural incomes, which continued through the second quarter this year.

A setback of four-fifths reversed the first-quarter increase in approvals in the construction, mining, and material-handling equipment industry.

Metalworking equipment appropriations were reduced almost a fourth from a year-ago, as new orders for metalcutting and metalforming tools turned spotty. Producers of engines and turbines added another cutback to that in the previous quarter, although the second-quarter decline was less sharp.

Electrical Machinery — A broad letdown in electrical machinery appropriations reflected less optimistic estimates of current business than had generally ruled the scene since the final quarter of 1958.

The only element reporting a gain was electric lighting and wiring equipment. This group extended to seven consecutive quarters its upsurge in capital spending plans.

Funds set aside for investment by manufacturers of electrical transmission and distribution equipment were only slightly off from the year-earlier level in the second three months this year.

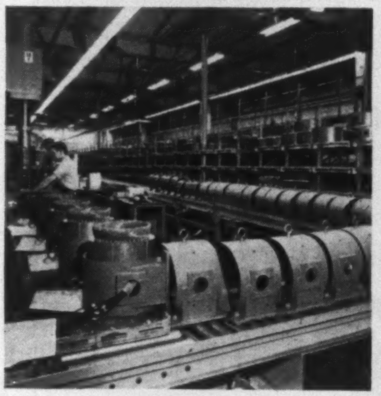
This apparent levelling out has followed a somewhat uneven trend of rises and declines over the past three or so years.

Appliances Off — Elsewhere, sharp cutbacks were the rule. Approvals were slashed more than one-half by household appliance producers, following a cutback of 17 pct in the first quarter. The radio and television group reversed a big first-quarter boost with a cut of one-third in the second quarter.

These declines came at a time when it was becoming clear that retail sales for some of these products had lost their previous buoyancy.

(continued on p. 73)

Metalworking Industries



Electrical Machinery

Electrical machinery makers set aside 29 pct less for capital spending in the second quarter.

Appliances, communications equipment and electronic components were way off. Lighting and wiring equipment showed a 37 pct gain over first quarter.

Transportation Equipment

Automakers lowered new capital spending projects 21 pct from first to second quarter '60.

Biggest percentage drop was the 63 pct registered by producers of aircraft and parts. Decline for the whole came to 36 pct below the first quarter of the year.

Instruments Industries

For the first half, instrument makers made new appropriations on par with first-half '59.

But from first to second quarter '60, they lowered them about 10 pct. Measuring and controlling instruments, however, raised sights 16 pct above first quarter levels.

What's Behind the Appropriations Drop?

- The rate at which companies increase or decrease capital appropriations are important figures to watch in gaging future plant and equipment spending.

While appropriations dollars may show quarter-to-quarter gains, the rate of increase compared with year-ago levels may be slowing down.

The chart below traces the quarterly percentage changes in metalworking capital appropriations on a year-to-year basis. It also shows the lead time between appropriations changes and spending momentum.

The present picture outlined in the chart shows why a decline in metalworking capital goods spending is expected by the end of the year and the first quarter of 1961.

Signs of a Comeback—You'll notice that metalworking companies in the first six months of the 1958 recession kept new appropriations well below the same period a year earlier.

Then in the last half of 1958, while the recession was still in full swing, new appropriations took a turn for the better compared to last half 1957. This was a sign that metalworking was expecting better business in 1959 and was laying the groundwork to meet it.

This increase was followed by a dramatic rise in the momentum of capital appropriations in the first and second quarters of 1959. From this peak the appropriations rate declined in third and fourth quarter 1959. But it still held up substantially over the same quarters a year earlier.

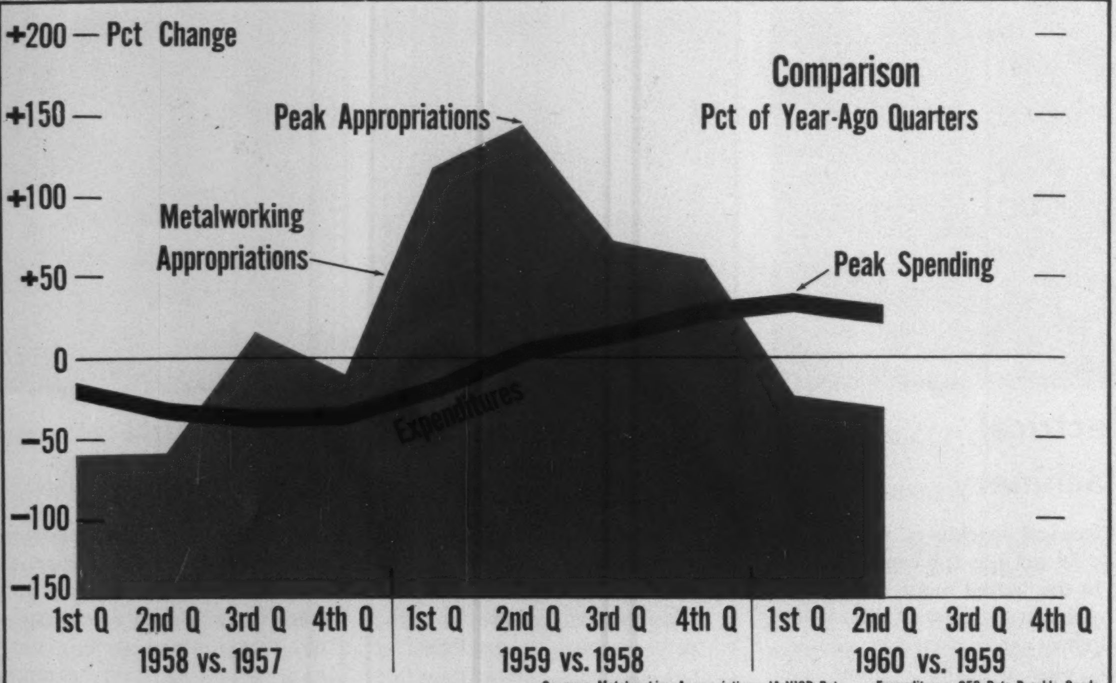
Final Gain—The final period of year-to-year gain occurred in the fourth quarter of last year.

It was not until the first quarter of this year that metalworking capital appropriations fell below those approved in the year-ago quarter. The decline was due entirely to steel industry cutbacks in capital spending plans.

Drop Spreads—But the second quarter '60 decline in new appropriations cannot be laid to any one industry in metalworking. Of the 38 industries reporting in the survey, 26 lowered totals.

A comparison of these percent changes in appropriations and expenditures shown on the chart below, shows how appropriations foreshadow the direction of actual spending in months ahead.

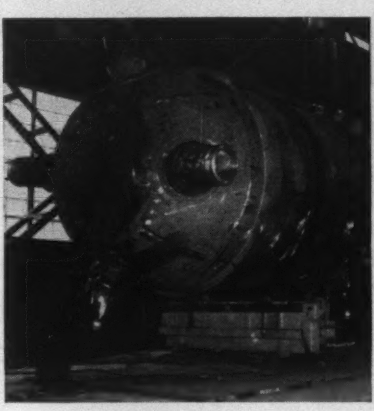
The peak rate of advance in capital appropriations took place in the second quarter of 1959. But capital spending did not peak until first quarter 1960—a full nine months later.



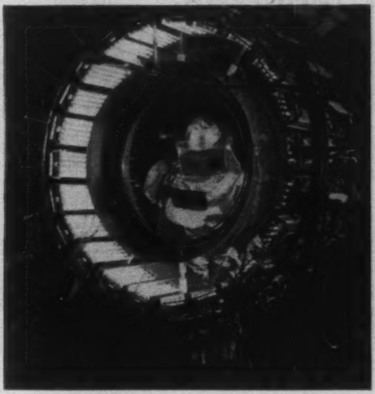
Sources: Metalworking Appropriations: IA-NICB Data Expenditures: SEC Data-Durable Goods

Bright Spots in First Quarter Outlook

NONFERROUS: Aluminum's expansion plans are a major factor in higher capital appropriations by nonferrous metals producers.



SPECIAL MACHINERY: A 39 pct gain in new appropriations was posted by makers of special industrial machinery in second quarter.



SCIENTIFIC INSTRUMENTS: New appropriations by this group (SIC 381) in the second quarter topped the first by some 12 pct.

(continued from p. 71)

First-quarter approval gains were wiped out by second-quarter losses in the electrical industrial apparatus, communication equipment, and electronic components industries. The cut in communication equipment appropriations brought to a halt eight quarters of continuous advances.

The latest cut in appropriations of the electronic components industry still left the first-half-1960 level more than a sixth above the first half of 1959.

Transportation Equipment — Transportation equipment appropriations emerged from decline in the first quarter last year. The subsequent upsurge continued, although with declining momentum, through the first quarter this year.

The final gain of 15 pct in the first quarter gave way to a cutback of almost one-half in the second quarter, bringing the expansion in this industry to a close.

A rise of one-third, however, was

(continued on p. 76)

Industry by Industry Reports on Spending Plans

Major Metalworking Groups

		Capital Appropriations—$ Millions						Pct Change	Pct Change	Pct Change
		1959				1960		2nd Qtr. 1960 over 1st Qtr. 1960	2nd Qtr. 1960 over 2nd Qtr. 1959	1st Half 1960 over 1st Half 1959
Industry	SIC Code	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.			
Metal Furniture	25	$1.6	$9.2	$1.6	$1.5	$1.6	$2.7	+63 Pct	−71 Pct	−60 Pct
Primary Metals	33	544.2	252.1	179.0	379.0	265.1	230.1	−13	− 9	−38
Fabricated Metal Products	34	47.6	37.9	41.4	71.6	56.4	32.4	−43	−15	+ 4
Machinery (exc. Electrical)	35	142.9	107.9	128.6	129.4	147.9	64.2	−57	−40	−15
Electrical Mach. & Equip.	36	62.7	95.7	120.5	74.0	91.0	64.7	−29	−32	− 2
Transportation Equipment	37	164.8	234.3	167.5	155.6	189.2	122.7	−35	−48	−22
Instruments, etc.	38	15.4	14.8	8.0	10.9	16.1	14.5	−10	− 2	+ 1
Total Reported[1]		979.2	751.9	646.5	822.1	767.3	531.4	−31	−29	−25
Total Estimated for All Metalworking[2]		$1,620	$1,170	$1,010	$1,340	$1,210	$840	−31 Pct	−28 Pct	−27 Pct

Based upon returns from 481 companies reporting 715 separate industry groups.

[1] Excludes ordnance and accessories, SIC Code 19, and miscellaneous metal manufacturing, SIC Code 39.

[2] Estimated for entire metalworking universe. This includes metalworking firms operating at least one plant employing 500 or more production workers in 1957. See coverage table, page 76.

Source: The National Industrial Conference Board.

Primary Metal Industries

Industry	SIC Code	Capital Appropriations—$ Millions						Pct Change	Pct Change	Pct Change
		1959				1960		2nd Qtr. 1960 over 1st Qtr. 1960	2nd Qtr. 1960 over 2nd Qtr. 1959	1st Half 1960 over 1st Half 1959
		1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.			
Blast Furnaces, Steel Wks. & Rolling Mills	331	$464.2	$184.0	$113.0	$331.7	$191.2	$140.4	−27 Pct	−24 Pct	−49 Pct
Iron & Steel Foundries	332	10.0	8.2	8.9	8.5	13.3	12.0	−10	+46	+39
Primary Smelt. Nonferrous[1]	333, 334	31.9	28.4	33.0	17.5	17.4	21.4	+23	−25	−36
Rolling, Drawing, Extruding Nonferrous	335	33.9	25.3	13.6	16.0	29.1	51.9	+78	+106	+37
Nonferrous Foundries	336	0.8	3.8	7.3	1.9	4.7	2.4	−49	−38	+52
Misc. Primary Metals	339	3.3	2.5	3.2	3.4	9.4	2.0	−79	−19	+96
Total	33	$544.2	$252.1	$179.0	$379.0	$265.1	$230.1	−13 Pct	− 9 Pct	−38 Pct

[1] Includes secondary nonferrous smelters, SIC 334.

Fabricated Metal Products

Industry	SIC Code	Capital Appropriations—$ Millions						Pct Change	Pct Change	Pct Change
		1959				1960		2nd Qtr. 1960 over 1st Qtr. 1960	2nd Qtr. 1960 over 2nd Qtr. 1959	1st Half 1960 over 1st Half 1959
		1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.			
Metal Cans	341	$12.0	$12.8	$9.6	$16.2	$22.2	$9.3	−58 Pct	−28 Pct	+27 Pct
Cutlery, Tools, Hardware	342	3.1	2.5	10.7	29.6	3.2	2.4	−25	− 3	0
Heating Apparatus (exc. Elec.) and Plumbing Fixtures	343	4.1	2.6	3.1	3.8	3.7	4.1	+12	+58	+16
Fabricated Struct. Products	344	6.6	6.7	6.0	9.9	15.0	3.9	−74	−42	+42
Screw Products & Rivets	345	1.9	3.8	2.3	3.7	2.1	1.3	−37	−66	−41
Stampings	346	15.7	5.2	6.7	5.0	4.8	7.4	+55	+42	−42
Coating, Engraving; Misc. Fabr. Wire Prod.	347, 348	0.7	1.4	0.3	0.9	1.9	0.6	−68	−57	+17
Miscellaneous Fabricated Metal Products	349	3.4	2.8	2.6	2.6	3.5	3.4	− 4	+20	+10
Total	34	$47.6	$37.9	$41.4	$71.6	$56.4	$32.4	−43 Pct	−15 Pct	+ 4 Pct

Transportation Equipment

Industry	SIC Code	Capital Appropriations—$ Millions						Pct Change	Pct Change	Pct Change
		1959				1960		2nd Qtr. 1960 over 1st Qtr. 1960	2nd Qtr. 1960 over 2nd Qtr. 1959	1st Half 1960 over 1st Half 1959
		1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.			
Motor Vehicles & Equip.[1]	371, 375, 379	$96.2	$190.1	$127.5	$97.9	$120.7	$95.8	−21 Pct	−50 Pct	−24 Pct
Aircraft & Parts	372	60.1	41.4	34.4	54.9	61.5	22.5	−63	−46	−17
Ship & Boat Building	373	6.4	1.3	2.5	1.6	4.3	2.5	−42	+88	−11
Railroad Equipment	374	2.1	1.4	3.1	1.2	2.7	1.9	−29	+34	+28
Total	37	$164.8	$234.3	$167.5	$155.6	$189.2	$120.9	−36 Pct	−48 Pct	−22 Pct

[1] Includes motorcycles, bicycles and parts, and miscellaneous transportation equipment.

Electrical Machinery

Industry	SIC Code	Capital Appropriations—$ Millions						Pct Change	Pct Change	Pct Change
		1959				1960		2nd Qtr. 1960 over 1st Qtr. 1960	2nd Qtr. 1960 over 2nd Qtr. 1959	1st Half 1960 over 1st Half 1959
		1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.			
Elec. Transmission Equip.	361	$8.3	$14.1	$56.3	$15.1	$10.1	$13.8	+37 Pct	− 3 Pct	+ 7 Pct
Elec. Indus. Apparatus	362	9.0	25.7	7.3	11.4	17.2	8.0	−53	−69	−27
Household Appliances	363	8.7	10.6	6.1	4.4	7.2	4.9	−32	−54	−38
Electric Lighting & Wiring Equipment	364	2.8	5.4	3.1	6.7	6.6	11.3	+72	+112	+120
Radio & TV Receivers	365	1.4	4.2	5.8	2.4	3.2	2.8	−14	−34	+ 7
Communication Equipment	366	10.1	10.1	28.2	14.7	13.1	3.3	−75	−67	−18
Electronic Components	367	21.1	23.2	12.4	18.3	32.7	19.4	−41	−16	+18
Misc. Electrical Equipment	369	1.3	2.4	1.3	1.0	0.9	1.1	+31	−53	−46
Total	36	$62.7	$95.7	$120.5	$74.0	$91.0	$64.7	−29 Pct	−32 Pct	− 2 Pct

Nonelectrical Machinery

Industry	SIC Code	Capital Appropriations—$ Millions						Pct Change	Pct Change	Pct Change
		1959				1960		2nd Qtr. 1960 over 1st Qtr. 1960	2nd Qtr. 1960 over 2nd Qtr. 1959	1st Half 1960 over 1st Half 1959
		1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.			
Engines & Turbines	351	$23.3	$7.0	$5.9	$23.6	$9.9	$5.0	−50 Pct	−29 Pct	−51 Pct
Farm Machinery & Tractors	352	18.9	14.2	11.8	12.9	10.5	7.7	−27	−46	−45
Construction, Mining, Handling Equipment	353	33.8	27.5	11.3	12.4	46.4	5.8	−88	−79	−15
Metalworking Machinery & Equipment[1]	354, 359	8.5	6.6	11.1	6.2	13.5	5.1	−62	−23	+23
Special Indus. Machinery	355	9.6	5.4	10.9	8.7	9.4	13.1	+39	+141	+50
General Ind. Machinery & Equipment	356	25.5	16.2	37.1	15.7	28.5	8.2	−71	−50	−12
Office & Store Machines	357	21.0	27.7	35.6	46.9	26.5	15.7	−41	−43	−13
Service Industry Machines	358	2.4	3.1	4.8	3.0	3.1	3.7	+21	+20	+24
Total	35	$142.9	$107.9	$128.6	$129.4	$147.9	$64.2	−57 Pct	−40 Pct	−15 Pct

[1] Includes miscellaneous, nonelectrical machinery, SIC Code 359.

Instruments

Industry	SIC Code	Capital Appropriations—$ Millions						Pct Change	Pct Change	Pct Change
		1959				1960		2nd Qtr. 1960 over 1st Qtr. 1960	2nd Qtr. 1960 over 2nd Qtr. 1959	1st Half 1960 over 1st Half 1959
		1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.			
Laboratory, Scientific & Engineering Instruments	381	$5.3	$4.7	$2.5	$4.7	$5.1	$5.7	+12 Pct	+21 Pct	+ 8 Pct
Measuring & Controlling Instruments	382	6.2	7.8	3.6	3.6	5.2	6.1	+16	−22	−19
Other[1]	383–387	3.9	2.3	1.9	2.6	5.7	2.7	−52	+20	+36
Total	38	$15.4	$14.8	$8.0	$10.9	$16.1	$14.5	−10 Pct	− 2 Pct	+ 1 Pct

[1] Includes optical instruments, surgical instruments, ophthalmic goods, photographic equipment and watches, clock-operated devices, SIC codes 383, 384, 385, 386, 387.

Appropriations per Worker

All companies in the industries listed below, with plants of 500 or more plant workers were queried. They account for about two-thirds of the total employment and buying power in the metalworking industry. The fourth column shows the percentage of production workers employed by the companies cooperating in this survey. The last column shows appropriations per production worker.

Industry and SIC Code	Production Workers, Thousands	Production Workers, Thousands	Pct of Total Employment	Appropriations per Production Worker,[1] $
	Companies With Plants of 500 or more	Cooperating Companies	Cooperating Companies	
Metal Furniture, 251, 252, 253, 254, 259	31	12	38 Pct	$632
Blast Furnaces, Steel Works, Rolling Mills, 331	595	313	53	2,477
Iron and Steel Foundries, 332	81	61	75	702
Primary & Secondary Smelting, Nonferrous, 333, 334	54	50	92	1,793
Rolling, Drawing, Extruding, Nonferrous Metals, 335	114	80	71	1,375
Nonferrous Foundries, 336	19	13	67	1,297
Misc. Primary Metals, 339	37	22	59	823
Metal Cans, 341	47	45	95	1,285
Cutlery, Hand Tools, Hardware, 342	54	35	65	1,294
Heating Apparatus (except elec.) & Plumb. Fixtures, 343	34	21	62	705
Fabricated Struct. Prods., 344	60	30	50	1,156
Screw Prods. & Rivets, 345	26	15	60	613
Stampings, 346	75	54	71	446
Coating, Engraving; Miscellaneous Fabricated Wire Products, 347, 348	21	10	47	375
Mis. Fab. Metal Prods., 349	54	36	66	345
Engines & Turbines, 351	71	58	82	762
Farm Mach. & Tractors, 352	60	34	56	1,262
Construction, Mining Handling Equipment, 353	111	78	70	971
Metalworking Machinery & Equipment, 354, 359	105	64	61	559
Special Industry Mach., 355	47	22	48	1,885
General Industrial Machinery & Equipment, 356	92	62	67	1,611
Office & Store Machines, 357	78	58	74	2,165
Service Ind. Machines, 358	38	22	59	649
Elec. Trans. Equip., 361	90	49	54	1,961
Elec. Ind. Apparatus, 362	134	65	48	679
Household Appliances, 363	96	46	48	987
Electric Lighting & Wiring Equipment, 364	55	30	54	929
Radio & TV Receivers, 365	71	27	38	524
Communication Equip., 366	113	52	46	1,153
Electronic Components, 367	95	62	65	1,337
Misc. Elec. Equipment, 369	27	8	30	523
Motor Vehicles & Equip., 371, 375, 379	638	546	86	809
Aircraft & Parts, 372	522	481	92	361
Ship & Boat Building, 373	61	31	50	357
Railroad Equipment, 374	43	26	61	337
Laboratory, Scientific & Eng. Instruments, 381	41	16	39	1,138
Measuring & Controlling Instruments, 382	41	26	64	706
Other, 383, 384, 385, 386, 387	77	20	26	639
Total	4,008	2,680	67 Pct	......

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* Based upon returns from 481 companies reporting 715 individual industry codes. Employment figures based on Iron Age Census data, 1957. Figures in last column calculated from unrounded data. Over 1,200 plants with 500 or more production workers reported.

[1] In dollars per production worker, based on appropriations made from first quarter 1959 through third quarter 1959 and plant employment of reporting companies in 1957.

SOURCE: The National Industrial Conference Board.

(continued from p. 73)

added to the first-quarter boost of one-fourth in railroad equipment approvals.

Shipbuilding Up—A sharp boost in shipbuilding appropriations during the second quarter this year reversed the slump that marked all of 1959 and the previous quarter.

On the other hand, the 1959 upsurge in approvals of the motor vehicle equipment producers came to a halt in the second quarter with a slash of one-half.

The aircraft builders also approved almost a half less in the second quarter period than a year earlier, with the first half of 1960 a sixth under the same period of 1959.

Instruments Top Out — Capital appropriations approved by the instruments industries advanced for six successive quarters extending from the last quarter of 1958 through the first quarter of 1960.

Changes in the momentum of this rise trace a smooth trend which reached a peak in the second quarter last year and receded into the first three months this year, when the rate of year-to-year gain was 4 pct.

New High—Since second-quarter approvals were just a shade under those of a year earlier, the total for the two quarters combined was about equal to the sum for the first half of 1959, a survey high.

In engineering and research instruments, a modest first-quarter curtailment was reversed with a gain of 20 pct.

Approvals in the measuring and controlling instruments industry, on the other hand, continued three previous quarters of decline. A continuation of the first-quarter rise in the other instruments industries caused appropriations for the first half this year to show a better rate of gain over the year-ago than they had in the second half of last year.

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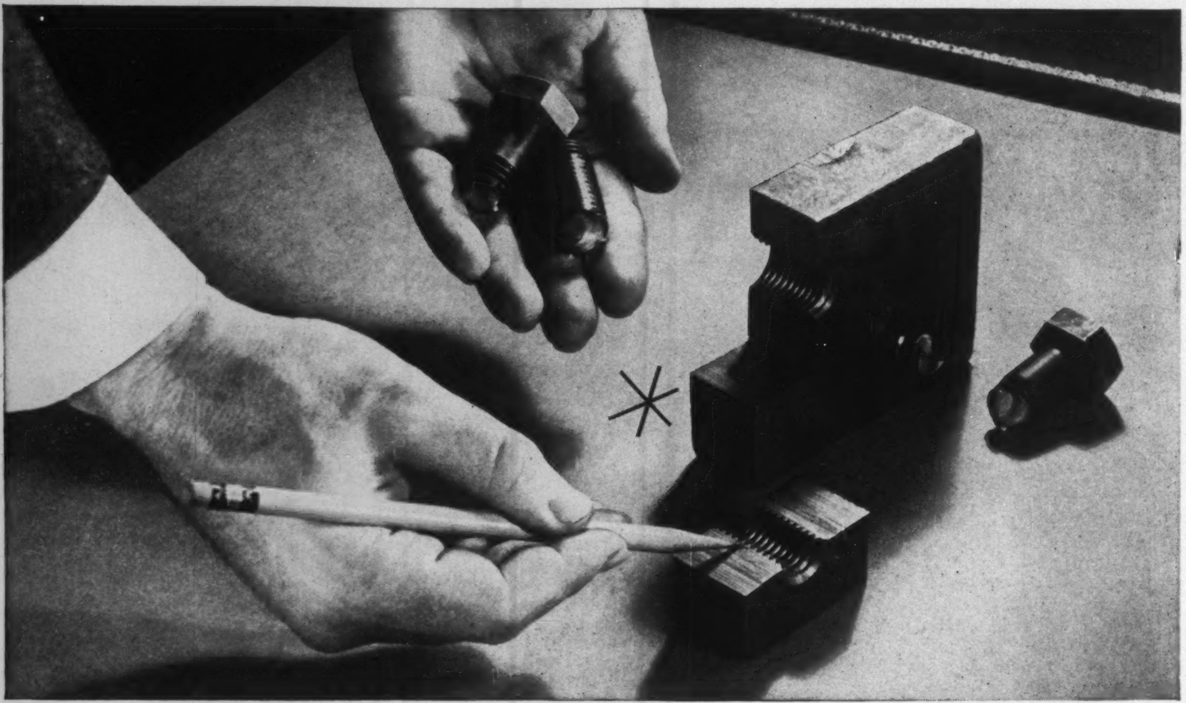


Showed way to save $7800

RB&W fastener survey of refrigeration unit suggested that hex screws be substituted for studs ...and castings be tapped with less costly clearance fit.

When there are no special design requirements or space clearance conditions, using studs of 1-inch diameter and smaller often penalizes the user needlessly. First, in direct costs, since the more economical *hex screws* will do the job. Second, in production costs, since studs require holes tapped with an expensive *interference* thread fit.

The RB&W Man pointed this out when his survey revealed over 250 stud fastenings per refrigeration unit. For this application, 250 hex screws cost $8.45 . . . for a saving of better than $22 over the studs and nuts. Annually this would total to $7800 . . . *clear profit.* And on top of this, reduced tapping costs, too.

Want to get the most from *your* fastener dollars? Ask for an RB&W man to make a survey. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

* *Specifying studs for fear that hex screws might damage castings during disassemblies is based on a groundless fear. Hex screws in threaded holes with clearance fit can be reused repeatedly without damaging the casting. In the test casting shown above, the hex screws were first tightened and removed 50 times—then torqued to breaking point. Cutaway section showed casting threads were still perfect, with no sign of stripping.*

RB&W

116th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.

Will 1961's Hold the Answers?

Automakers Hope They've Guessed Right

The first of the 1961 auto models are out next week. Now, producers hope their questions will be answered.

But automakers aren't the only ones with questions. Steel producers have a few also.—By A. E. Fleming.

▪ In about a week, eight of the new 1961's will be in the showroom. Other automakers are close behind. But this year, manufacturers and dealers are awaiting the answers to a backlog of important questions.

Among these questions: Can compacts really take 50 pct of the new car market in the coming year? Presidents George Romney of American Motors Corp. and H. E. Churchill of Studebaker-Packard Corp. have no doubts about it. However, at General Motors Corp., Ford Motor Co., and Chrysler Corp. there is less certainty.

Will medium compacts provide their producers with the "plus" sales they confidently predict? Some automakers are wondering if maybe this isn't wishful thinking and that, perhaps, smaller, cheaper newcomers may gouge into the sales of standard Pontiacs, Oldsmobiles, Buicks and Dodges.

U. S. or Foreign?—Will it prove true that more competition from U. S. compacts will send foreign car sales further downhill, or will imports bounce back after an off-year as overseas manufacturers claim they will?

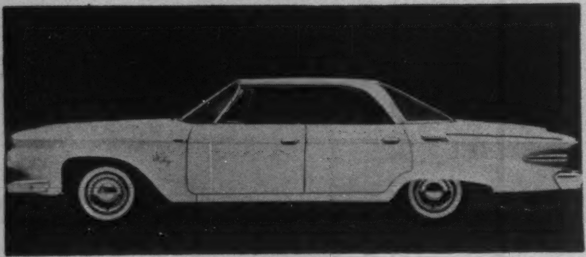
Is the public ready to accept aluminum engines? Coping with this problem will be makers of the Rambler, Buick Special, Oldsmobile F-85, Pontiac Tempest (optional aluminum engine will be available), and, later in the season, the Dodge Lancer, Dart and Plymouth.

Another big question is: Are Americans interested in a small, low-price convertible? This question has already been partially answered by Studebaker. Its convertible Lark took about 10 pct of S-P production as a 1960 model. Rambler is betting it can do just as well with production of an American softtop. But GM and Chrysler contend they couldn't sell enough to justify the tooling.

From Steelmakers Too—But automakers aren't the only ones asking questions. Steel producers have a few they would like the answers to also. They wonder: When will the big steel orders start coming in? This is a question they've been asking for months.

Steel salesmen will be eying car companies' 10-day sales reports as

IN THE RACE: Among the entries from Chrysler Corp. in the race for 1961 auto sales are the Dodge Polara (top), in the medium-price field; the Dodge Dart (center), in the low-price field; and the Valiant's new V-200 series (bottom), competing in the growing compact field.



NEW PERSONALITY: The 1961 Plymouth is being labeled as the car with new personality. This is the Fury four-door hardtop series.

ALL ALIKE: All the 1961 De Sotos will be hardtops. This is the four-door hardtop in the new line aimed at medium-price minded buyers.

close as they will their own charts.

But the fate of steel orders doesn't hinge entirely on new model sales. Another factor is the success auto dealers have in ridding themselves of 1960 models.

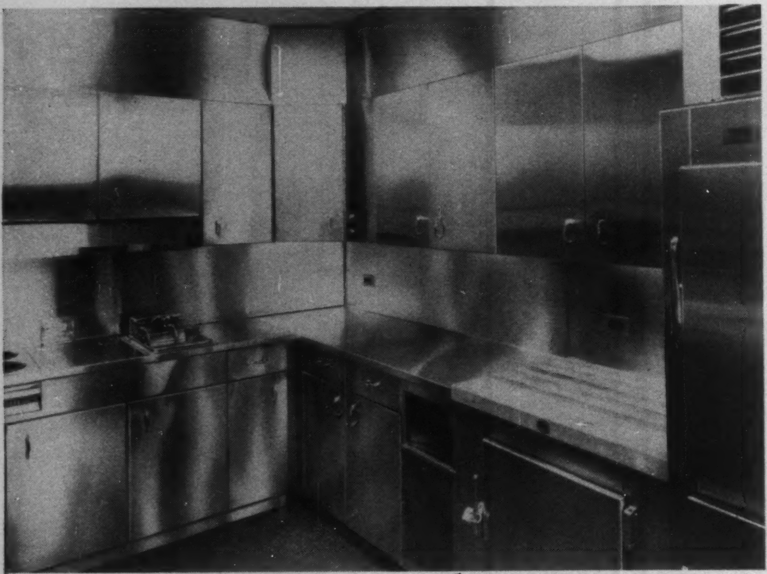
Out Before In—During August, the 1960 models didn't disappear as quickly as predicted. Of the 900,000 autos on hand September 1, 750,000 were 1960 units. Can dealers dispose of 1960's as fast as 1961's come in? Last week the output of new models showed signs of perking up as practically the entire industry swang into production.

The only notable exceptions are Ford's Thunderbird and the Lincoln Continental which will be delayed until early next month. Pontiac won't send forth any Tempests on a regular basis until later in October.

Reasons Are Plain—The reasons for the delays are plain. The Tempest has some complex engineering innovations including transaxles and an R-cylinder engine. Ford, for the first time, will make its own T-Bird bodies. Previously, Ford has turned the body work over to the Budd Co. Then, too, the T-Bird has a completely new look which has drawn much criticism.

Scheduled introduction dates for 1961 models are: Sept. 29, Plymouth, Valiant, Dodge, Dart, Lancer, Imperial, Ford and Falcon; Oct. 3, Cadillac; Oct. 5, Buick and Buick Special; Oct. 6, Pontiac, Oldsmobile, Oldsmobile F-85, Mercury, Comet, and Chrysler; Oct. 7, Chevrolet and Corvair; Oct. 12, Studebaker and Rambler; Oct. 14, De Soto; Nov. 3, Tempest.

"All exposed and unexposed surfaces shall be of **STAINLESS STEEL**..."



Cafeteria and Executive Kitchen, *Continental Grain Co.*, Offices: New York City. Designed by *Designs for Business, Inc.*, New York, N. Y. Fabricated by *Stainless Food Equipment Co.*, Newark, N. J. Installed by *Ben Mernit*, New York City

- The specifications for this executive cafeteria called for all kitchen metal surfaces, both exposed *and* unexposed, to be constructed of stainless steel. Only *lifetime* stainless steel can offer the durability and ease of maintenance necessary for maximum sanitation in food handling.
- MicroRold Stainless Steel was chosen for its consistent uniformity of gauge, outstanding finish and well-known fabricating qualities.
- *Why not investigate the advantages of stainless steel for your next project?*

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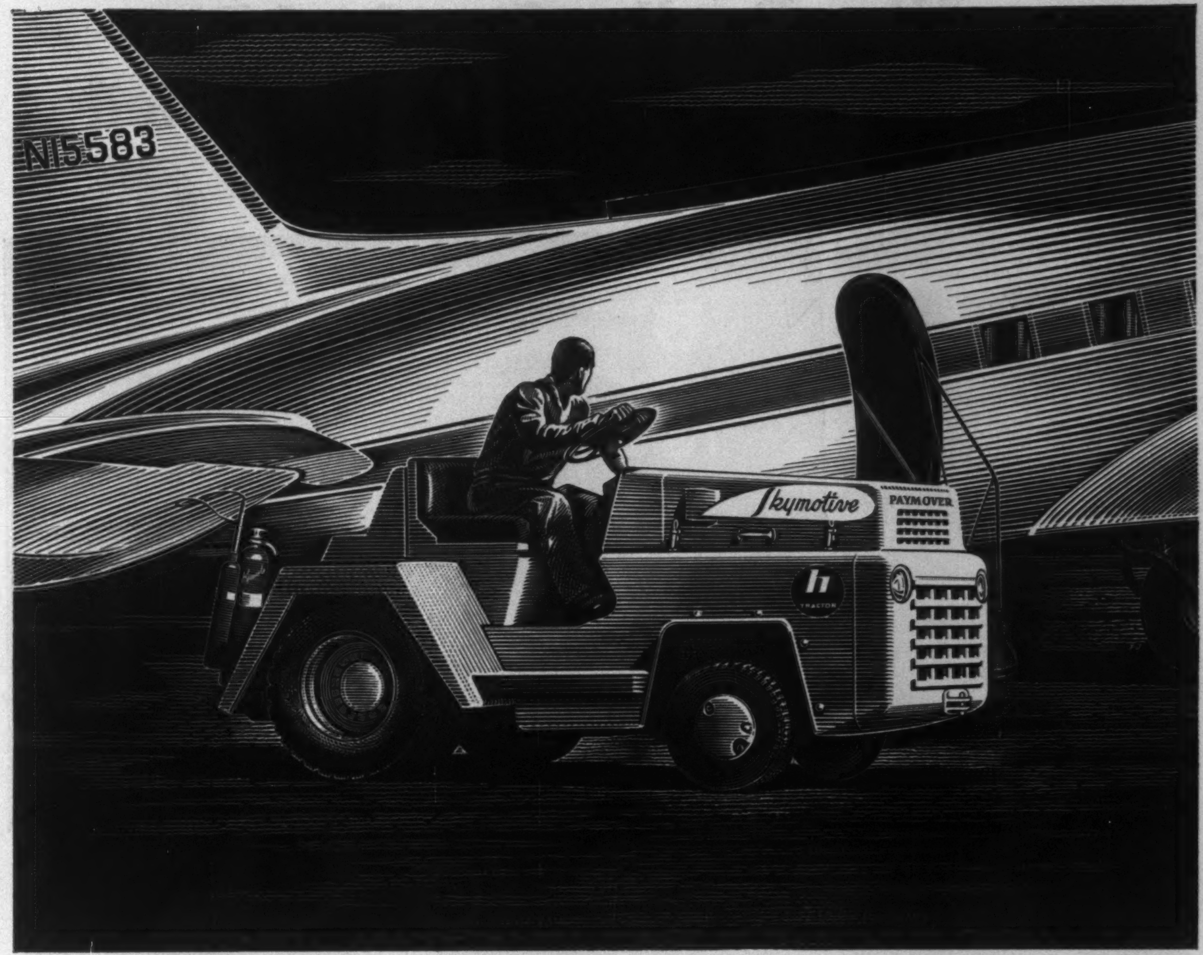

Long-lasting, quality Morse Tools give Hough smoother holes . . . increased production . . . lower maintenance

Dependability, improved performance . . . these are the outstanding features of The Frank G. Hough Co.'s Payloader, Paymover and Paylogger tractors.

It's small wonder they turn to Morse for cutting tools to help build these quality products. Morse Cutting Tools are known throughout industry for their lastability . . . their quality . . . their capacity to machine faster, smoother, more accurately.

Let Morse help you with your cutting tool problems. Call your Morse Franchised Distributor today. He's the man with the answers.

MORSE

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MORSE TWIST DRILL & MACHINE CO., NEW BEDFORD, MASSACHUSETTS

Warehouses in: NEW YORK · CHICAGO · DETROIT · DALLAS · SAN FRANCISCO

Morse means more production . . . smoother, more accurate production . . . with every type of cutting tool from drills, reamers, taps and dies, to end mills, milling cutters, slitting saws and "specials". So, if you want the best from every cutting tool you buy, mark your order "MORSE". For if you want *Morse Quality,* there's only one way to get it . . . *specify Morse.*

A Division of VAN NORMAN INDUSTRIES, INC.

ACTUAL TESTS* PROVE

Allen-Bradley Standard Duty Push Buttons can be installed *in about half the time!*

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3
START
AB
STOP
AB

BULLETIN 800
STANDARD DUTY
PUSH BUTTONS

In accurately timed tests, Allen-Bradley standard duty push buttons required *about half the installation time*—on the average—than each of four other popular makes. This saving in installation time means "dollars" saved on the job.

How come only famous A-B standard duty push buttons possess this time and moneysaving advantage?

The answer lies in the molded, wrap-around cover—which also contains the contacts. When the cover is removed, the wiring terminals are *out in the open*—ready for wiring—and you have plenty of working space. The two cover screws are captive—they cannot fall out and get lost. And with the contacts in the cover, they are protected against accidental damage and careless wiring. Naturally, these push buttons have double break, silver contacts that never need service attention. There are two concentric knockouts on each end of the base, which are removed from the *outside*—the heavy, pressed steel base will not bend out of shape.

Your local A-B distributor has these Bulletin 800 push buttons *in stock*. Call him today—you'll save time and money on your next job.

**Using recognized standard duty push buttons, installations were made by an experienced electrician under identical conditions. He was not connected with Allen-Bradley Company in any manner.*

A-B STANDARD DUTY PUSH BUTTONS
Made as a one-, two-, or three-unit station—with pilot light available. Readily changed for horizontal or vertical mounting. Convertible two- or three-way selector switch supplied with or without pilot light.

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Expansion Follows Market Shift

Change in Defense Spending Spurs Action

Defense spending is going more and more into space research. Less is going to airplane manufacturers.

This, coupled with a booming population in the Pacific Northwest, has resulted in a market shift. Industry is expanding to meet it.—By R. R. Kay.

▪ More and more metalworking products and services are finding a good market in the Pacific Northwest.

The past few years show a steady shift from defense production to civilian work. And now the pace is quickening. Chief reasons for the change are the booming population and the change in defense spending.

The 1960 census shows Seattle's King County, for example, as the 18th largest in the United States with a population of just under one million. As for defense spending, it's now going into more and more space research and development rather than to airplanes.

Companies Shift Too—This has prompted many Pacific Northwest companies to shift with the times. Base-broadening is the current trend. Here are some of the latest important moves that point to this:

In Seattle, Bethlehem Steel Co.'s Pacific Coast Div. just completed a $25 million project of expansion and updating.

Bethlehem took advantage of the region's edge in low-cost hydroelectric power in converting from openhearth to electric furnaces. It also added to its facilities a 32-in. blooming mill, an automatic bar mill, and a new 30-in. plate mill. The latter is the only one in the entire area.

More Is Planned — Bethlehem also has plans for more expansion next year. It will add a new office building and enlarge its fastener, bolt, and nut plants.

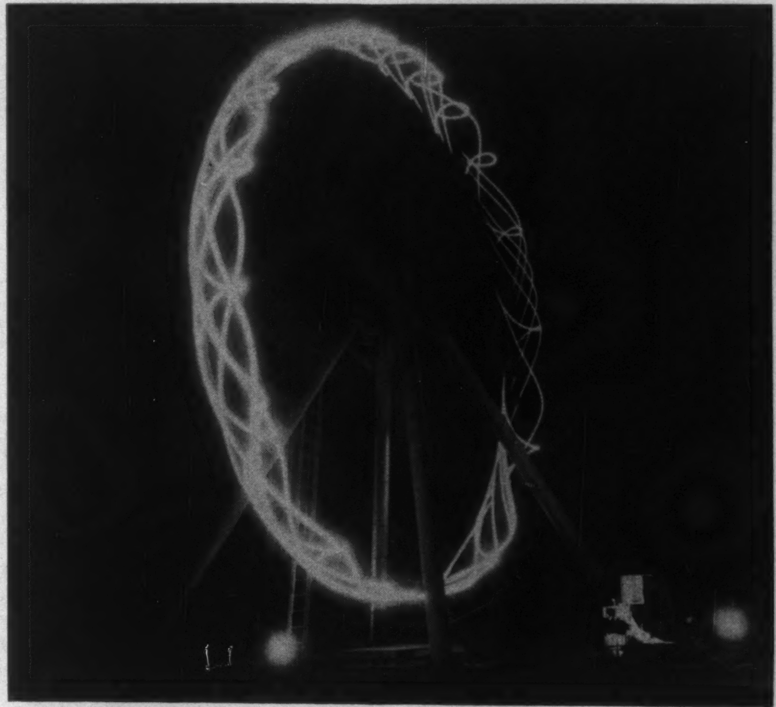
Other companies are jumping into the expansion picture too, with plans to spend some $140 million. Among the projects are a steel mill by Webb and Knapp Co. at Anaconda, Mont.; two potlines at United Pacific Aluminum Corp., Longview, Wash.; and an alumina plant and rolling mill for Harvey Aluminum, Inc., The Dalles, Ore.

There are also reports that Aerojet-General Corp., manufacturer of jet engines in Azusa, Calif., is scouting Washington for a 50,000 acre plant site.

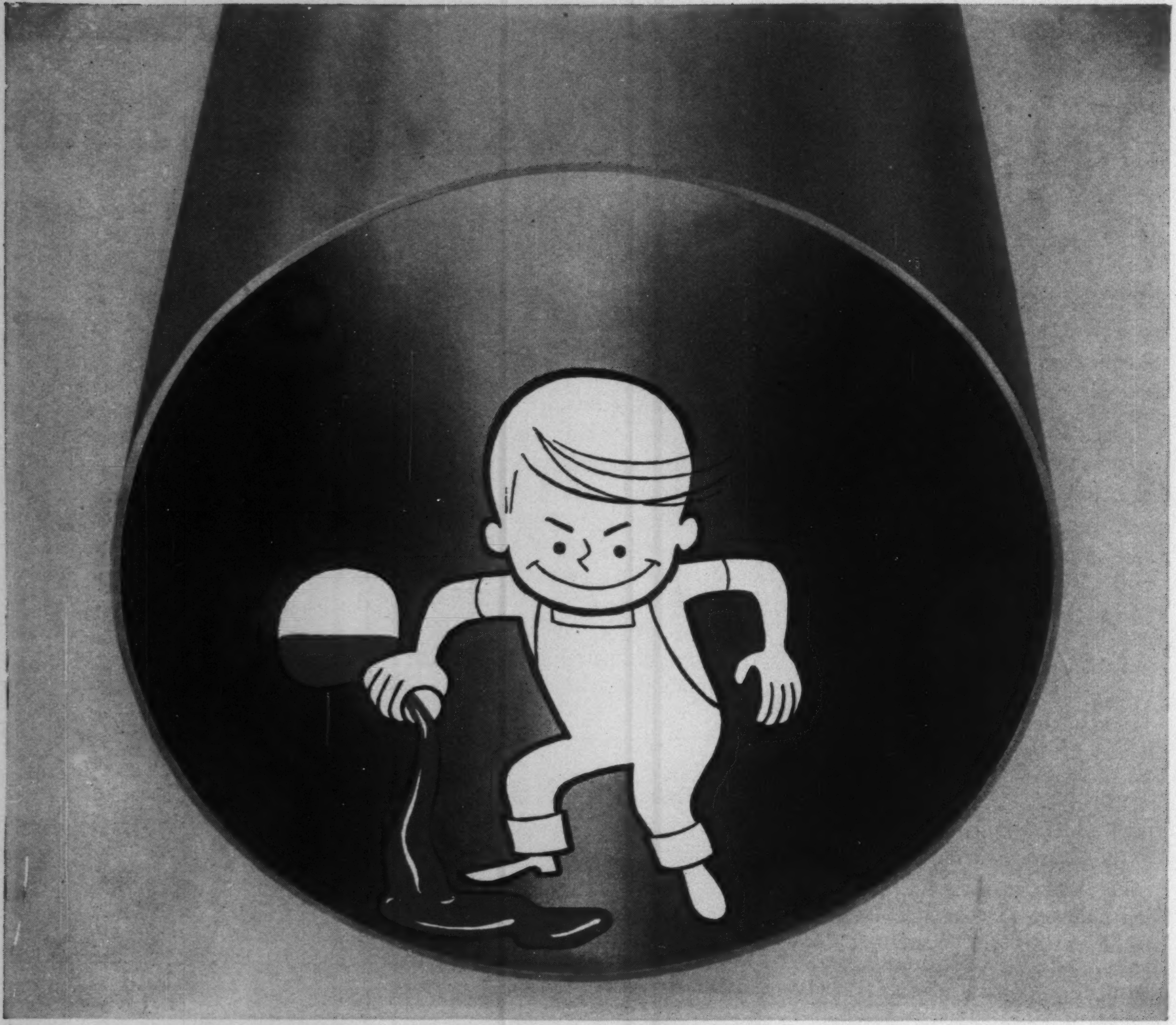
Power Supply Demand—The demand for power supplies reflects the growing industrial load. Seattle City Light will spend $175 million through 1965 in dams and transmission facilities. It plans to double the local power supply by 1970.

Even shipbuilding, a sick industry since the end of World War II, shows signs of recovery.

Round and Round and Into Space



A FERRIS WHEEL?: Resembling an amusement park ferris wheel, this is actually a missile component test boom revolving on a radar range. It is located at the Engineering and Research Center of Ford Motor Co.'s Aeronutronic Div., Newport Beach, Calif.

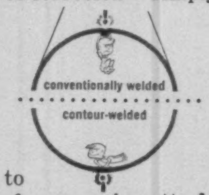


"The Gravity Kid" shows how

CONTOUR-WELDED STAINLESS TUBING DEFIES CORROSIVE ATTACKS

It's smoother inside than any other tubing—welded or seamless—because the patented* Contour-welding process virtually eliminates the weld bead. And this smoother surface ensures greater resistance to corrosion—simply because there are fewer focal points for corrosive attack.

You see, in conventionally welded tubing, gravity pulls the molten metal down into the tubing. This forms a bead that is difficult to remove by cold working. And cold working can lead to undercuts that become focal areas for corrosive attack.



Contour-welded tubing, however, is welded at the bottom. Gravity still pulls the molten metal down. But now the weld area corresponds to the contour of the tube. There's virtually no weld bulge on the inside surface. And even on the O.D., the weld seam closely conforms to the tubing contour.

Contour-welded tubing is smoother, too, than seamless. That's because it's formed from uniformly rolled strip steel, whereas seamless is extruded or pierced.

But get full details on this corrosion-resistant tubing. Send for our free 48-page manual on Contour-welded tubing in sizes from 1/8″ to 40″ O.D.—in stainless and high alloy steels, titanium, zirconium, zircalloy and Hastelloy.*

*U.S. Patent 2,716,692

*Trademark Haynes Stellite Co.

TRENTWELD® Stainless and High Alloy Tubing

Trent Tube Company, a Subsidiary of Crucible Steel Company of America. General Offices and Mills: East Troy, Wisc.; Fullerton, Calif.

Will Atomics Alter Automation?

They May be Needed to Cope With Complexities

Many industry observers feel new automatic controls are necessary. And atomic physics may be used to create them.

So far, metalworkers have shown very little interest in atomic potential. It could be used in metal-cutting controls.

—By R. H. Eshelman.

▪ Can atomic physics create new types of automatic controls? Some industry observers say they will be needed to cope with increasingly complex manufacturing problems. But so far metalworkers have shown little interest in atomic potentials.

Recently, however, nuclear specialist J. H. Tolan of Lockheed Nuclear Products Div., offered some interesting proposals for metalcutting controls. They were blueprinted in a paper delivered at the summer meeting of the Society of Automotive Engineers.

Mr. Tolan notes that recent improvements in the operation of machine tools mean requirements are more than can be met by existing mechanical or electro-mechanical systems. Specifically he points to automation that precedes the ability of an operator to control it.

Could Be Trouble — A prime case is cited in the disastrous runaway of a two-dimensional cutting operation. The process aborted when one motion jammed while the other continued. Consequence was that the cutting tool chewed through the workpiece and continued on through the table.

The solution to the problem proposed by the nuclear engineers is a monitoring device utilizing a radioisotope backscatter technique.

In the device, radiation is emitted through a restricted opening to the monitored object. A focused collimator admits some of the scattered radiation back to a crystal detector. Such a probe detects changes in shape or contour of five pct of an object cross-section ⅛ in. diam., says the designer.

It will monitor position of the cutting tool relative to the work and respond to any unwanted variation in relative position.

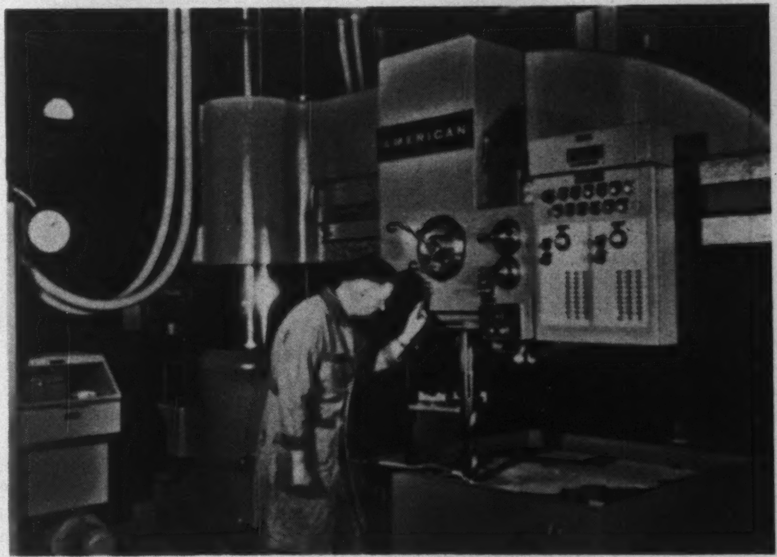
Other Uses Too — Besides this type of application, Mr. Tolan foresees numerous other metal-cutting uses for this atomic technique: Control of contour of screw threads during grinding; measure of dimensions and location of internal cuts; and the measure of wall thickness of bored openings in castings.

As a result of investigations, the technical feasibility of using the backscatter technique seems certain, company officials report. Specific applications next need to be investigated and probe units developed and installed on machine tools.

Controls Battle Looms

Pointing up a coming shakeout in the controls field, General Electric has announced a 10 pct reduction in cost of its entire line of Mark series numerical controls.

Marketing officials say that the next few years will be critical for this market. Many new companies have shown new systems at recent shows. But only the well financed, national organizations with adequate service and training facilities are expected to survive.



SPEED DRILL: This American Tool Works Co. numerically controlled openside traveling drill can put a 3 in. diam. hole through steel plate at the rate of 5½ in. per minute. Work table positions accuracy to 0.001 in.

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TO
.0002"
SOMERS
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302,304,305,316,321,347,430 17-7PH, PH-15-7MO plus various high temperature alloys and rare metals are precision produced by Somers up to 25" wide in gauges as thin as .001", narrower widths to .0002".

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INDUSTRIAL BRIEFS

A. O. Smith Research—The A. O. Smith Corp. will build an advanced research center at Middleton, Wis., at an estimated cost of $2 million. Advanced research activities are scheduled to begin in the new facility by the middle of 1961.

Expanded Capacity — An 18-month modernization and expansion has been completed at Inland Steel's Chicago Heights Works. The plant's capacity has been boosted 75 pct from 80,000 to 140,000 tons a year. The unit has also been re-powered and re-equipped to produce more merchant bar products from billets, adding to the capacity of Inland's merchant mills at its Indiana Harbor Works.

Leasing R & D—A special research and development lease plan for metal companies engaged in government contract work is offered by Nationwide Leasing Co., Chicago. The R & D lease features terms of from 3 to 5 years. A cancellation clause is available, if desired. Leases may range from $25,000 to $1 million or more.

Michigan Purchase — Westinghouse Air Brake Co. has purchased the assets and business of Petch Mfg. Co. and Petch Industries, Inc., Alpena, Mich. They are manufacturers of machine tool quality pneumatic and hydraulic cylinders, fluid power control panels, and aircraft flight control units. The plants will be operated by the Industrial Products Div., Westinghouse Air Brake Co.

Electrada Acquires Airite—The Electrada Corp. acquired Airite Products, Inc., Los Angeles. The West Coast titanium facility will function as a division of Electrada. Joseph Divizia, president and founder of Airite Products, continues as president and general manager of the new Electrada Div. and will serve as a member of the Corporate Advisory Committee.

Changed Name and Address — Allmetal Screw Products Co.'s wholly-owned subsidiary, Blumberg Supply Corp., 274 Front St., Hempstead, L. I., New York, has changed its name and moved to new quarters. It will be known as the Alisco Co., Div. of Allmetal Screw Products Co., Inc. at the new address, 809 Stewart Ave., Garden City, L. I., New York.

New Press for Bellwood — Expansion of Reynolds Metals Co.'s Bellwood extrusion plant includes installation of a huge self-contained aluminum extrusion press. Initial construction work on an aluminum-covered addition, to house the press and associated equipment, now is underway. Expansion will cost more than $1 million, excluding cost of associated facilities and equipment.

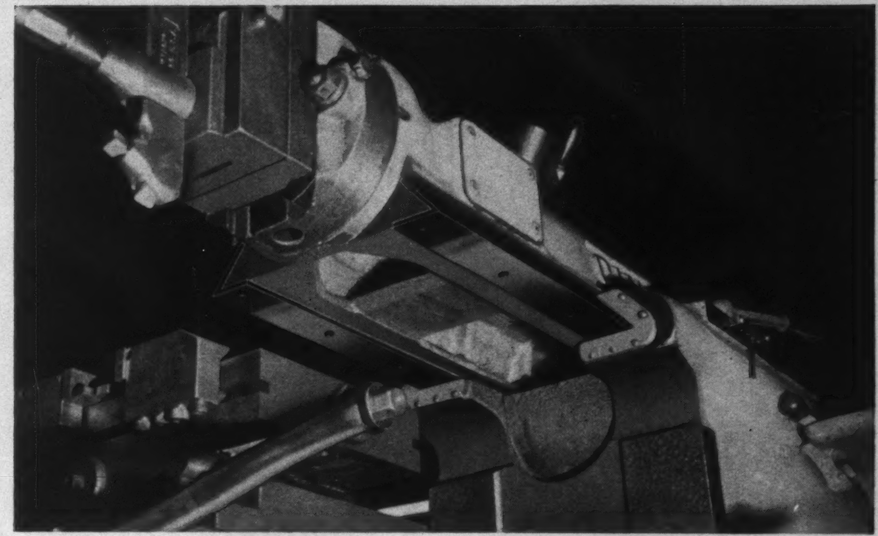
Three Join Idaho—Idaho Maryland Industries, Glendale, Calif., has acquired three metal fabricating companies. The companies, Industrial Tubular Equipment Co., North Hollywood, Calif.; National Forging & Tool Co., North Hollywood, Calif.; and ITEECO Colorado Corp., Denver, Colo.; will be operated as one division with three plants.

Trilobe Gets Ackermann — Trilobe Coupling Corp., New York, now owns the former Ackermann Factory of Wheeling Steel Corp. Announcement of the closing of Ackermann Factory as a Wheeling Steel operating unit was made in February of this year. The factory property contains about 15 acres of land. The sale included factory buildings, machinery, stores, and equipment.

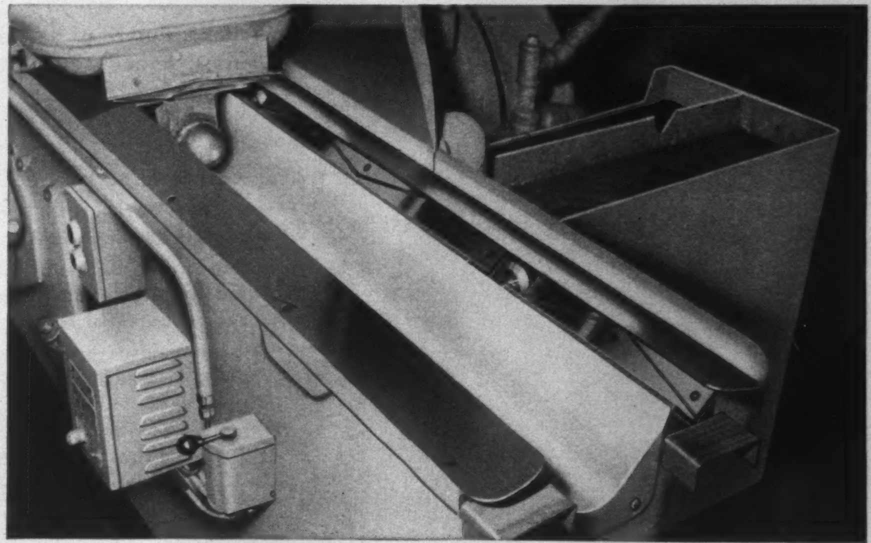
Plutonium Lab Starts — A privately financed plutonium laboratory has been put into full operation at Battelle Memorial Institute. It is located at the Institute's Nuclear Research Center, 17 miles west of Columbus, O. The laboratory is equipped to conduct most types of metallurgical studies.

WEAR PLATES

ANOTHER *Lamina* BRONZE-PLATED PRODUCT



Lamina bronze-plated wear plates used on shaper ways.



Lamina bronze-plated wear plates used on grinder ways.

Lamina bronze-plated wear plates and their many uses are completely described in Bulletin WP-58. Send for your free copy.

Lamina
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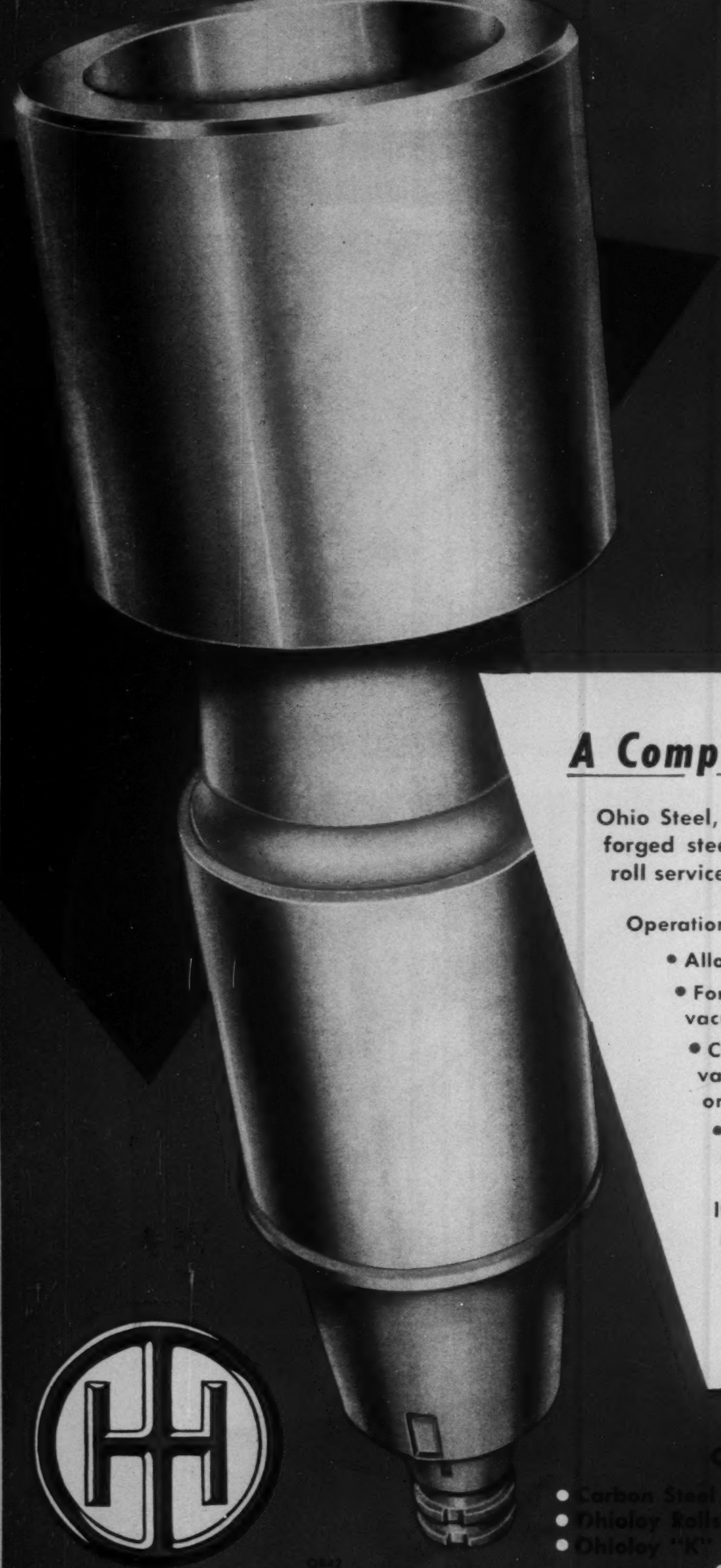


Ohio

FORGED SLEEVES and Cast Steel or Forged Steel Arbors for Back-Up Rolls

A Complete Back-Up Roll Service

Ohio Steel, manufacturers of all types of iron, steel and forged steel rolls, announces a new complete back-up roll service.

Operations Now Include:

- Alloy Cast Steel Back-up Rolls and Arbors
- Forged Steel Back-up Rolls and Arbors from vacuum poured, degassed steel.
- Custom forged Back-up Roll Sleeves from vacuum poured, degassed steel applied to new or used cast steel or forged steel arbors.
- Machine down and resleeve previously sleeved back-up rolls

If you're looking for a complete back-up roll service that'll meet your most exacting specifications, contact your nearest Ohio roll sales engineer.

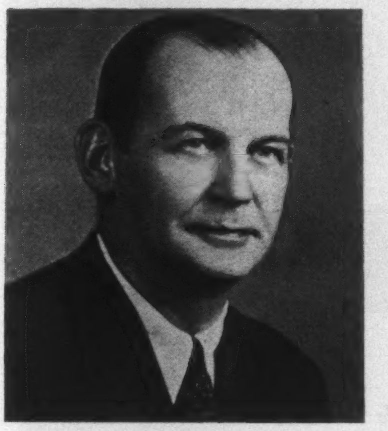
OHIO IRON AND STEEL ROLLS

- Carbon Steel Rolls
- Ohioloy Rolls
- Ohioloy "K" Rolls
- Flintuff Rolls
- Double-Pour Rolls
- Chilled Iron Rolls
- Denso Iron Rolls
- Nickel Grain Rolls
- Special Iron Rolls
- Nioloy Rolls
- Forged Steel Rolls

THE OHIO STEEL FOUNDRY CO., LIMA, OHIO

PLANTS AT LIMA AND SPRINGFIELD, OHIO... *Virtually at the center of the steel industry*

E. S. Bunn, appointed general manager, Research and Development Dept., Rome, N. Y., Revere Copper & Brass Inc.



P. V. Martin, will head the Foreign Dept., Engineering and Construction Div., Koppers Co., Inc.

Hubbell Metals Inc. — **Milton Mill,** elected executive vice president.

Sun Chemical Corp. — **Eugene Jacobson,** elected a vice president.

The Goodyear Tire & Rubber Co., Metal Products Div.—**H. J. Lafaye,** named general manager.

Research-Cottrell, Inc. — **J. E. Schork,** appointed director, manufacturing.

Keystone Steel & Wire Co.—**J. B. Kopec,** appointed director, research and metallurgy.

Allis - Chalmers Manufacturing Co., Research Div.—**Will Mitchell, Jr.,** appointed acting director.

Bailey Meter Co. — **C. H. Barnard,** appointed sales manager, Marketing Dept.

Townsend Co. — **D. J. Belcher,** named asst. to vice president, West Coast operations, Santa Ana, Calif., headquarters.

The Carpenter Steel Co.—**H. O. Beaver,** appointed asst. general superintendent, Reading, Pa., plant.

Anaconda Sales Co. — **D. J. Rowland,** named asst. sales manager.

The McKay Machine Co.—**R. L. Croasmun,** appointed asst. secretary.

Standard Screw Co.—**Worthington Mixter,** elected secretary.

Stainless and Strip Div., Jones & Laughlin Steel Corp.—**L. B. Warstler,** named asst. general sales manager.

Kaiser Aluminum & Chemical Sales, Inc.—**H. J. Ruhl,** appointed central regional industrial foil and container sales manager.

The Cleveland Cap Screw Co.—**H. D. Burdick,** appointed general sales manager.

Atlantic Research Corp., Solid Propellant Div.—**J. N. Rossen,** appointed director.

Huck Manufacturing Co. — **W. A. Garrett,** appointed director, purchases.

Vulcan Containers Inc.—**G. R. Zies,** appointed asst. secretary and treasurer.

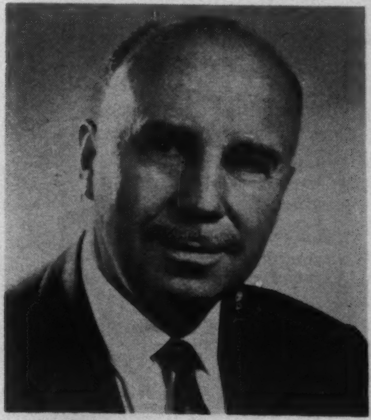
Electrosolids Corp. — **J. M. Phipps,** appointed director, marketing.

The Analytical & Control Div., Consolidated Electrodynamics

(Continued on P. 91)

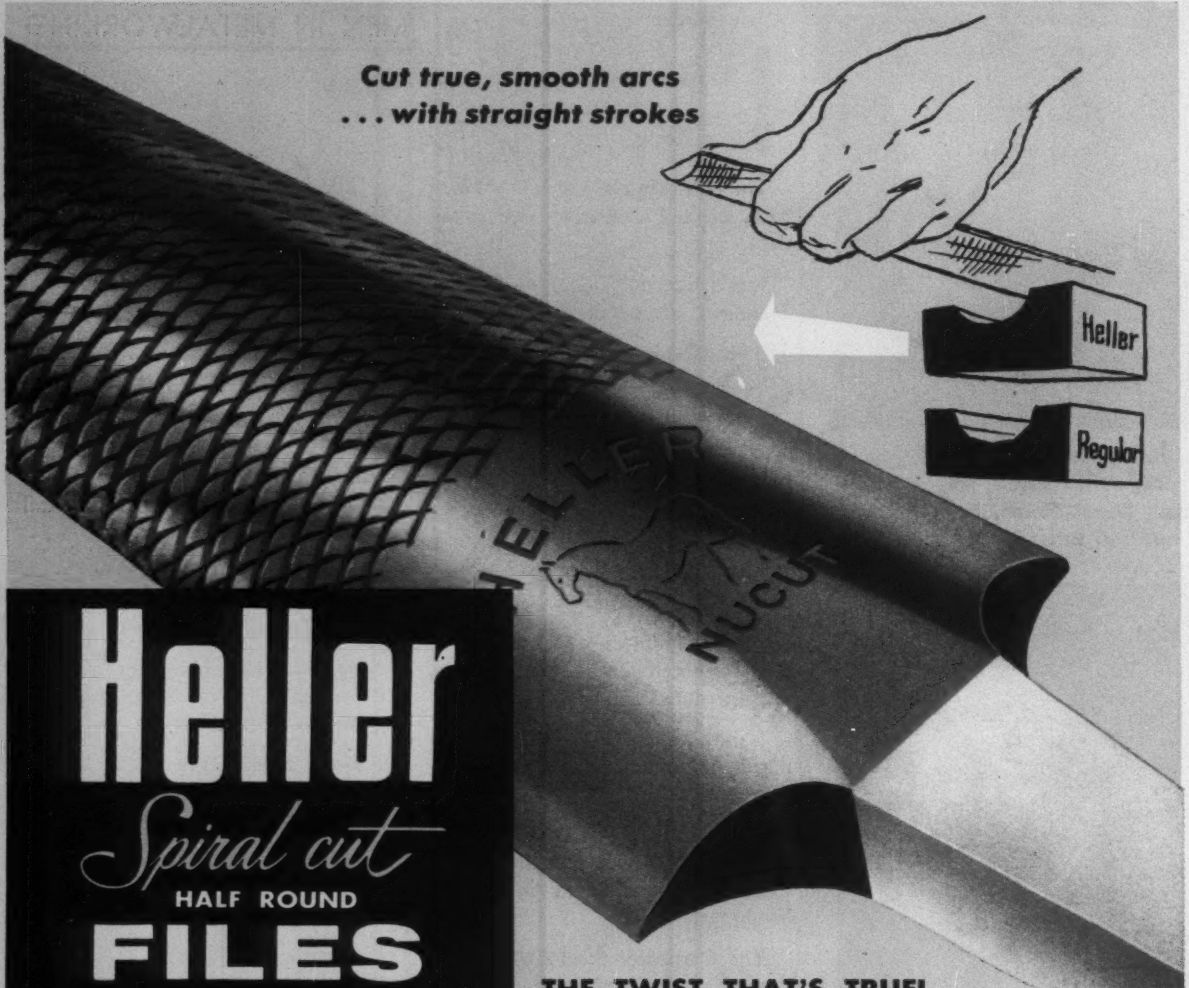
C. E. Peterson, named Division manager, Mackintosh-Hemphill Div., E. W. Bliss Co.

E. A. Kister, appointed manager, architectural sales and development, Allegheny Ludlum Steel Corp.



L. K. Whitcomb, named director, market research, Wheeling Steel Corp.

Cut true, smooth arcs
. . . with straight strokes



Heller
Spiral cut
HALF ROUND
FILES

INDUSTRIAL DISTRIBUTORS
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HELLER TOOL CO.
SINCE 1836

TAKE THE GAMBLE OUT OF BUYING! Get the double assurance of Heller Files and your Heller Distributor's dependable service the next time you order. They are "sure bets" for complete satisfaction.

THE TWIST THAT'S TRUE!

ROLLING ACTION IS BUILT IN! Perfect smooth arcs come naturally with Heller Spiral Half Round Files. No need for rolling action. It's built in by Heller's Spiral Cut. Grooving is prevented.

20% MORE TEETH AT WORK! The exclusive spiral cut of Heller Half Round Files brings more teeth to bear on the surface than any other file of comparable size.

LASTS LONGER! Spiral Cut Half Round Heller Files — with exclusive indented over-cut — multiplies width of upcut teeth three times . . . makes files last longer.

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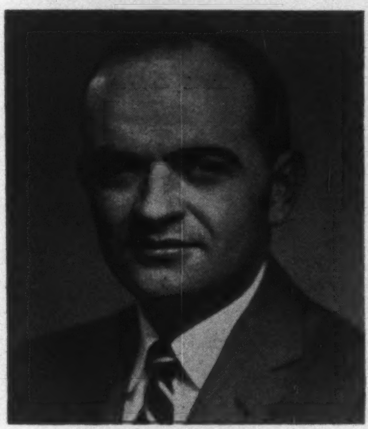
(Continued from P. 89)

Corp.—**C. K. Hines,** appointed asst. to director of engineering, program development.

T. J. Cope Div., Rome Cable Corp.—**W. H. Korb,** named asst. sales manager.



E. V. Ladd, Jr., appointed director, corporate development, Associated Spring Corp.

Kerotest Manufacturing Co., Steel Products Div.—**K. P. Harger,** appointed eastern sales manager.

The Seymour Manufacturing Co. —**G. N. Stuart,** appointed works manager.

James B. Clow & Sons, Inc. — **K. S. Clow, Jr.,** named asst. to the president.

Detroit Div., Bliss & Laughlin, Inc. — **B. B. Berger,** appointed metallurgical engineer.

T. E. Dalby, named manager, Sales Engineering Div., Sales Dept., Bethlehem Steel Corp.

W. H. Boyce, appointed executive vice president, Royal Electric Manufacturing Co.

Sel-Rex Corp.—**Thomas Kohler,** named New York State resident sales engineer; **René Sonnenfeldt,** appointed district manager, New York State.

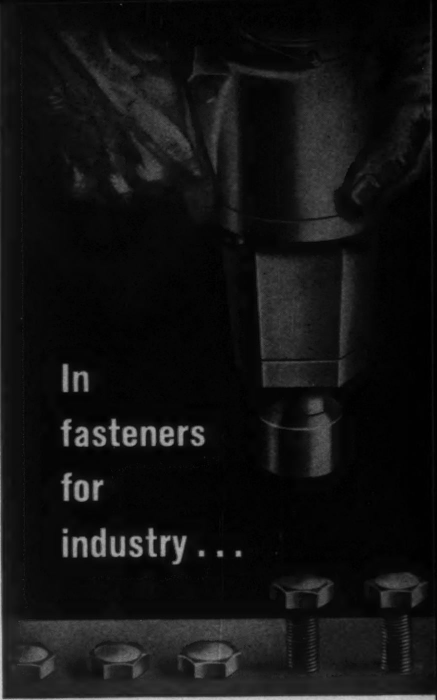
Metal Industries Div., The Diversey Corp. — **L. J. Stockwell** and **C. W. Cockrum,** named sales representatives.

Anaconda Aluminum Co. — **Wayne Varley,** appointed sales representative, New York area.

G. S. Arneson, appointed director, marketing, Delta-Star Electric Div., H. K. Porter Co., Inc., Pittsburgh.

Koppers Co., Inc., International Div. — **R. L. Woodard,** named project manager, Argentine operations, and **C. C. Taylor, Jr.,** named

(Continued on P. 94)



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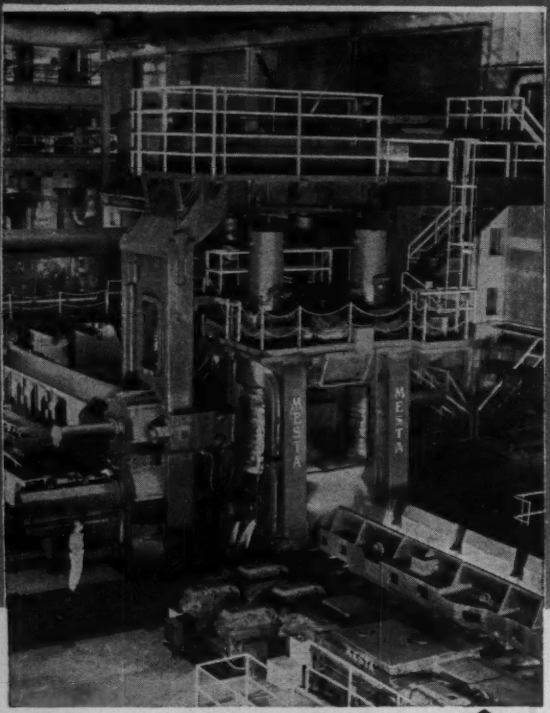

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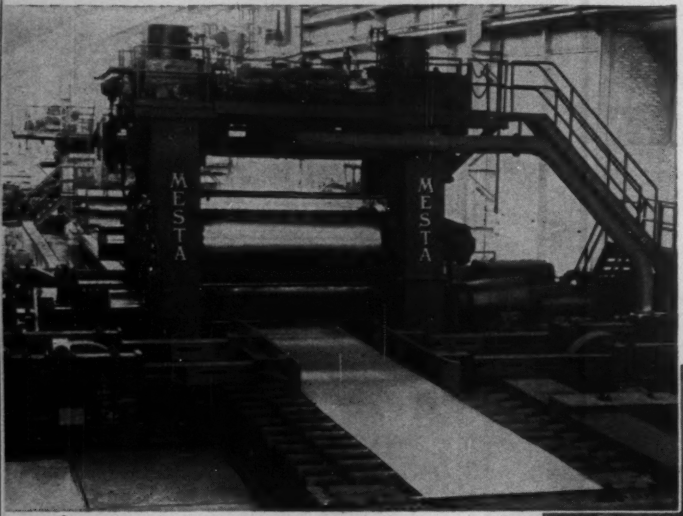
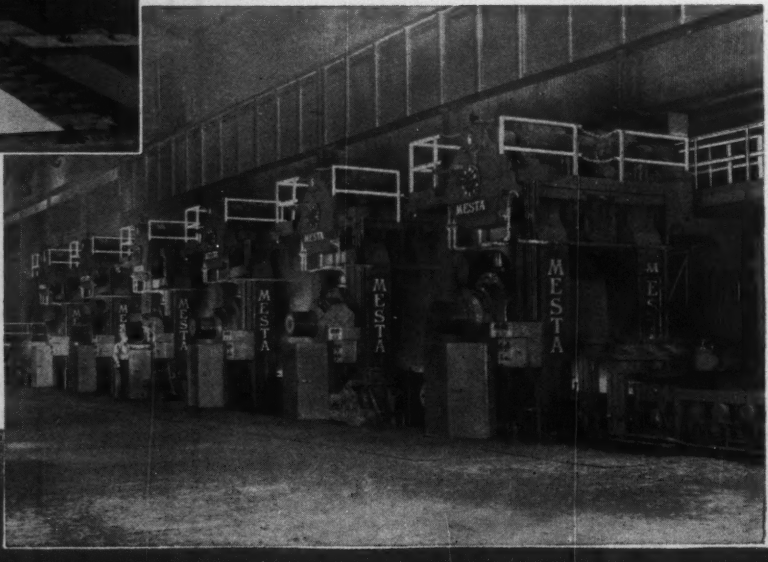
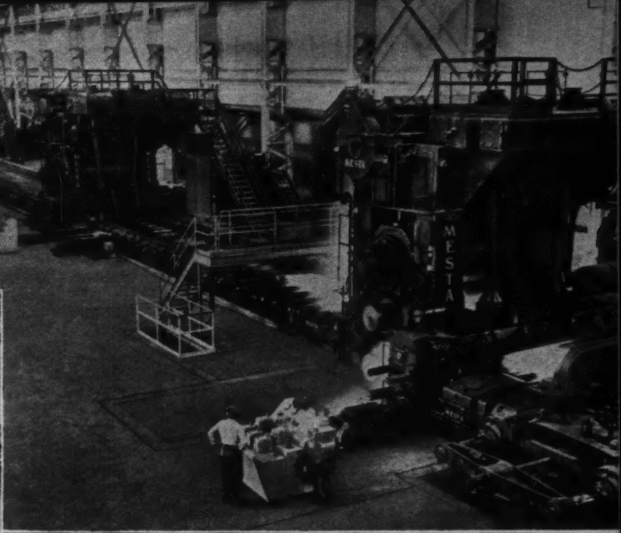


MESTA 132" Four-High Reversing Plate Mill



Six Finishing Stands with Three Vertical Edgers on the MESTA 44" Four-High Hot Strip Mill



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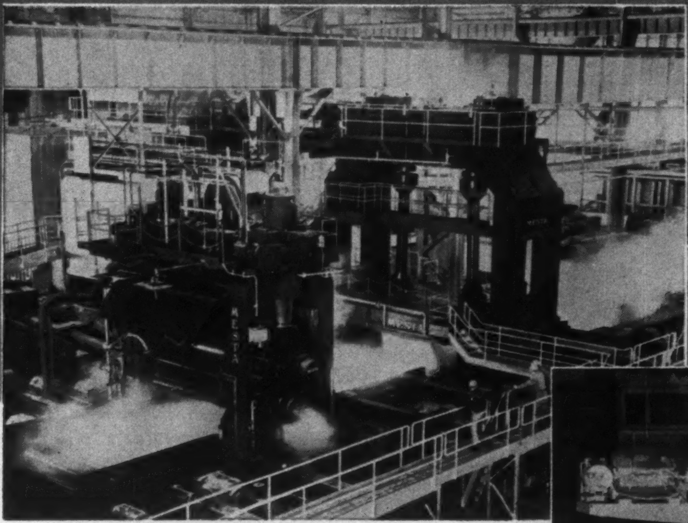
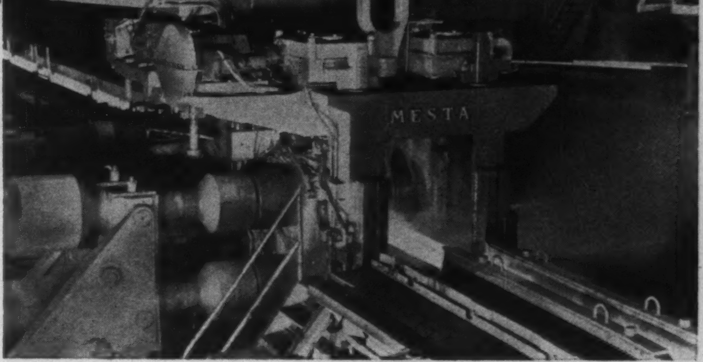
Universal Roughing Stands Rolling Strip Steel

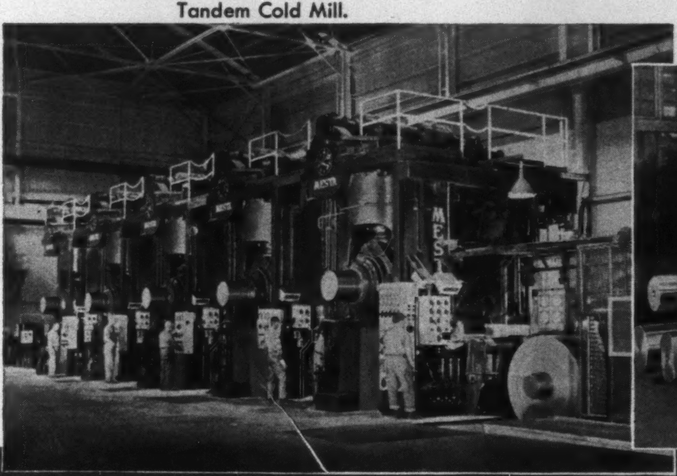
Rolling Slabs and Plates on the MESTA
140" Four-High Reversing Mill and
Vertical Edging Mill





MESTA Universal Structural Mill Rolling
Wide Flange Beams on the 44" Universal Stand
and the 34" Edging Stand

Rolling Strip Steel for Tin Plate in Coils
on a MESTA 48" Four-High Five-Stand
Tandem Cold Mill.

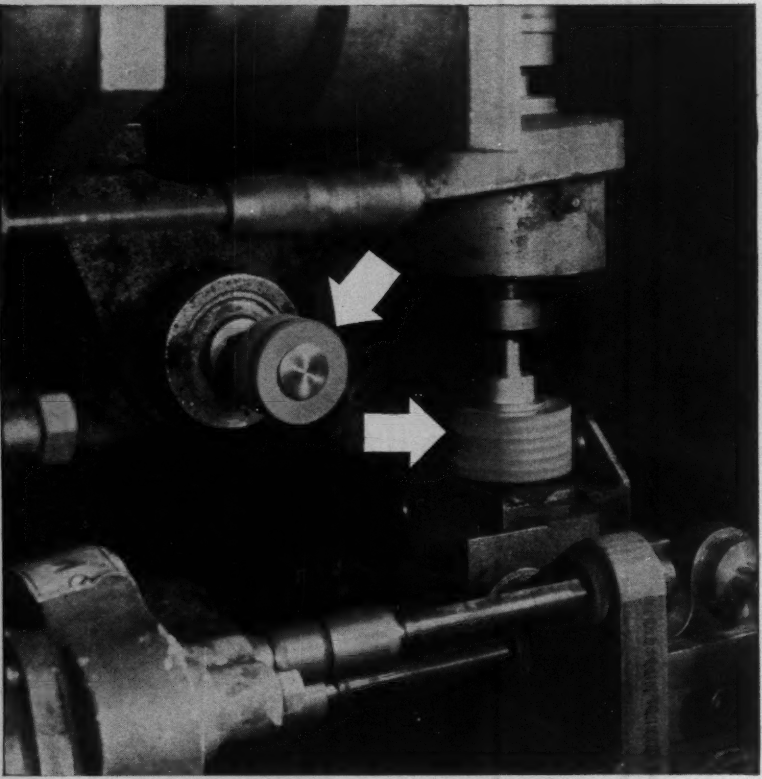


MESTA Hot Strip Mill Working Rolls

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

FLASH *. . . it's gone . . .*



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OSBORN

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes
Foundry Production Machinery

(Continued from P. 91) project manager, Brazilian operations.

T. J. Ault, appointed president, Automotive Division, The Budd Co., Detroit.

G. R. Fox, elected vice president, manufacturing, Joy International, S. A.

Selas Corp. of America—**J. S. Rauchut,** appointed chief estimator, central estimating section; special engineered machinery.

OBITUARIES

S. L. Mather, retired operations vice president, Cleveland Cliffs Iron Co.

D. C. Mills, manager, industrial relations, Bethlehem Steel Co.

W. P. Schmitter, 62, engineering vice president, The Falk Corp., Milwaukee.

R. C. Page, 61, Des Moines, Iowa sales representative, Joseph T. Ryerson & Son, Inc.

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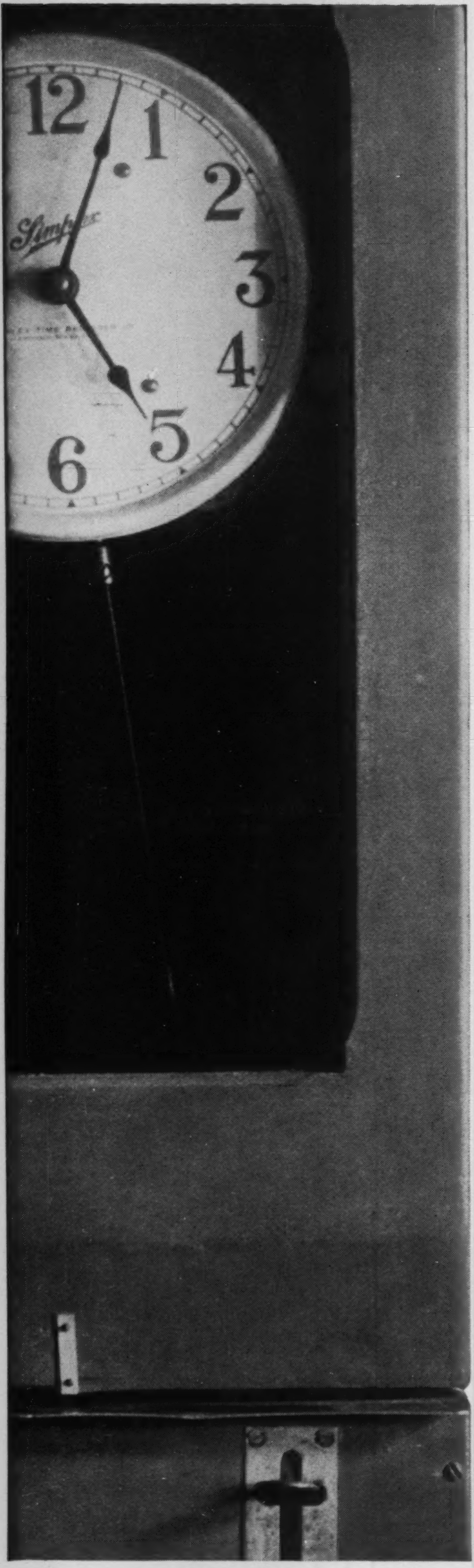

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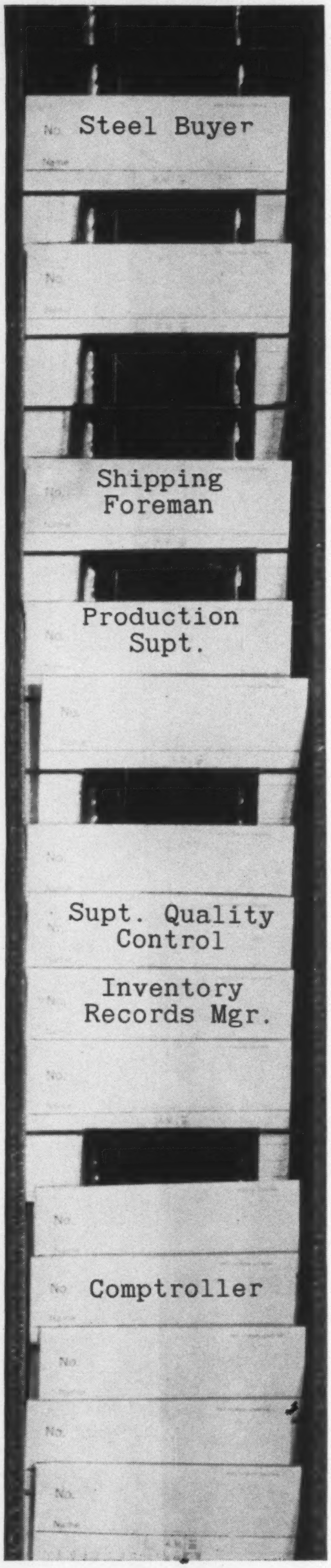


Line Forms Structural Members At Joist-per-Minute Rate

By **C. F. Kaunitz,** President, and **C. H. Guenther,** Engrg. Director, United Welders, Inc., Bay City, Mich.

A new approach to making structural joists centers on a revolutionary welding line.

It's now possible to produce to order — rather than to stock. This promises to reduce handling and storage costs.

▪ Many companies enjoy the benefits of automation in both machining and assembly. However, metal fabricators have found very few companies that are willing to tackle the design of structural - automation equipment. This is especially true where welding is involved.

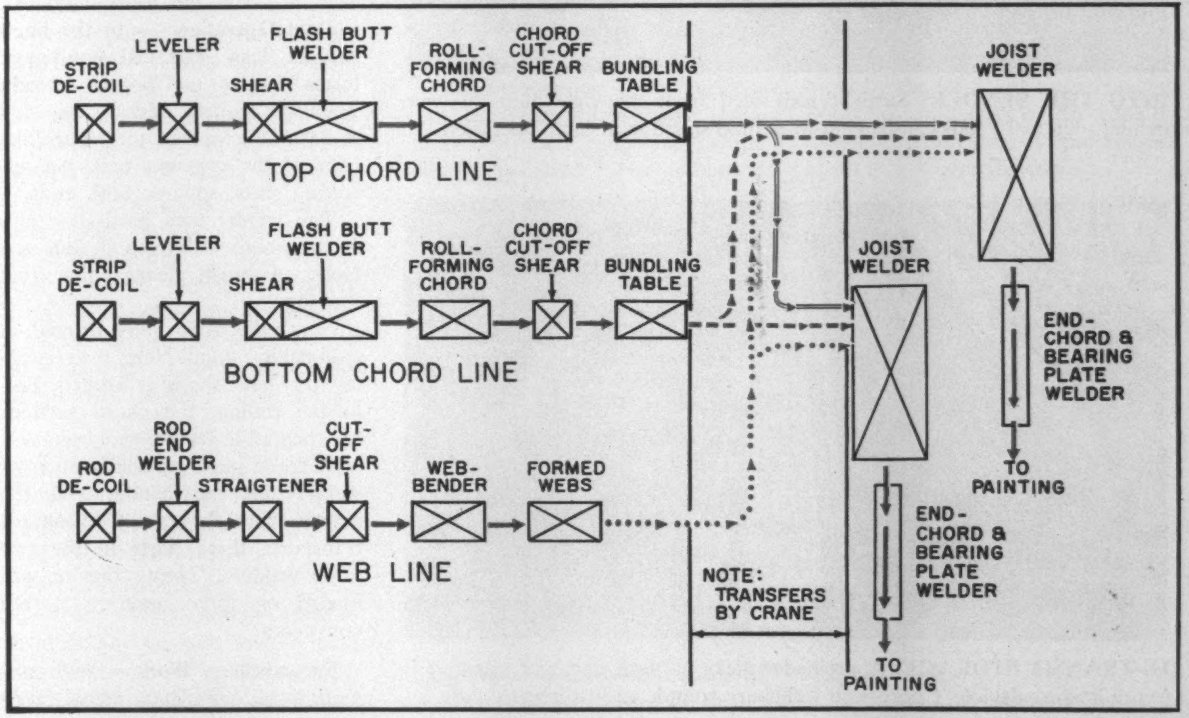
The picture is changing fast. A major change revolves around the development of an integrated line that starts with rod-and-strip coils, and ends with open-web joists. This new line, made by United Welders, Inc., turns out joists for the construction industry at the rate of one assembly per minute.

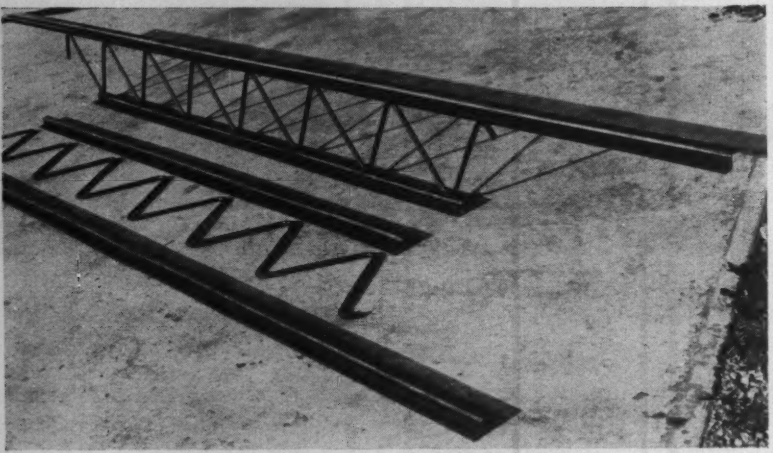
The welded joists support floors and roofs in light-activity buildings. All welds are made automatically.

Produce to Order—This new approach to metal-joist fabrication promises to alter both production methods and marketing practices in the entire building industry. It's now possible to produce to order—rather than to stock. This promises a reduction in handling costs, and these savings will extend to the customer.

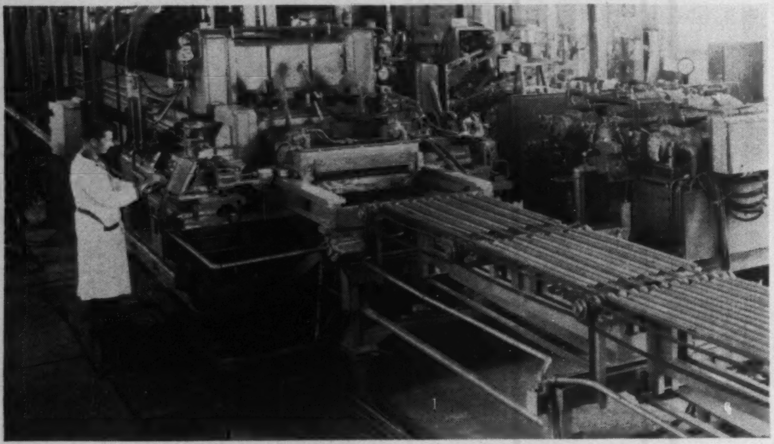
Automatic processing improves product quality and appearance. Uniformity also remains high. Why? Because both webs and chords are cold worked, less material does the same job — or the same amount of

Three Legs Feed the Automatic Welders

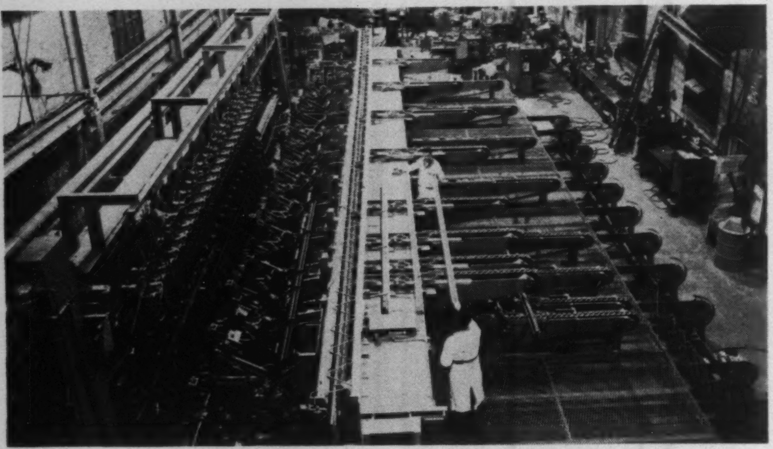

STRIP DE-COIL
LEVELER
SHEAR
FLASH BUTT WELDER
ROLL-FORMING CHORD
CHORD CUT-OFF SHEAR
BUNDLING TABLE
TOP CHORD LINE
STRIP DE-COIL
LEVELER
SHEAR
FLASH BUTT WELDER
ROLL-FORMING CHORD
CHORD CUT-OFF SHEAR
BUNDLING TABLE
BOTTOM CHORD LINE
ROD DE-COIL
ROD END WELDER
STRAIGTENER
CUT-OFF SHEAR
WEB-BENDER
FORMED WEBS
WEB LINE
JOIST WELDER
END-CHORD & BEARING PLATE WELDER
TO PAINTING
JOIST WELDER
END-CHORD & BEARING PLATE WELDER
TO PAINTING
NOTE: TRANSFERS BY CRANE



PARTIAL ASSEMBLY: This is the condition of the joist as it leaves the joist welder. Another machine welds the end chords and bearing plates.



INTO THE BENDER: Straight rods feed from the right into the web bender. Up to 12 rods can be bent to desired shape in a single operation.



IN-TRANSIT STORAGE: A preloader picks up each part and transfers it to the loading device. Chord-web welds are completed in three seconds.

material in a joist can handle a bigger job.

With the integrated line, coils of web rod, ½ to 13/16 in. diam, and coils of chord strip, from 0.100-0.194 in. thick in widths from 4-8 in., are the only stock needed. Various combinations of rod and strip are formed. Then, they're cut off and welded to make any of the 25 different standard joist sizes.

Fast Changeovers—It takes about 10 minutes to adjust each machine in the line for a run of different size joists. Some machines are duplicated. This allows two different sizes to be made at the same time.

Rod coils are de-reeled, straightened, cut to the desired length and conveyed to the bending machine, automatically. Bends are formed in up to 12 rods at a time. The bender turns out 60 average-length webs per hour.

It's easy to set bends in the rod. First, the rod is stretched beyond the steel's elastic limit to prevent spring-back. This action also insures straight panel sections. Each panel consists of two straight legs on either side of a bend. This arrangement provides optimum strength and rigidity in the fabricated joists.

Dual Operation — In the line's parallel legs, identical equipment forms the top and bottom chords. Then the leading edge of one coil is flash-butt welded to the trailing edge of the previous coil. An upcutting shear squares both ends.

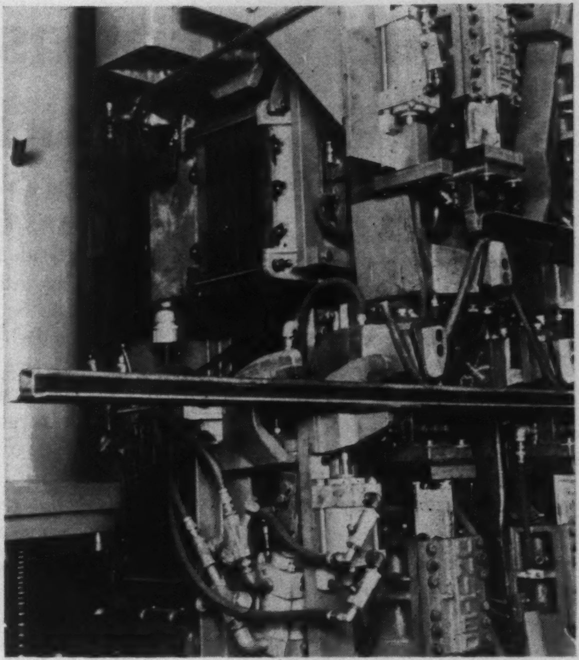
The welder uses hard-alloy dies for trimming flash from all four surfaces. A brush cleans chips from the top.

Next, the strip runs through a cold-rolling stand. Here, the characteristic "hat" shape is formed. Following rolling, the chord sections are sheared to length.

A crane picks up the bundles of webs from the bender and the chords from the cut-off shears. It transports these parts to the two joist welders. Here, they're unloaded on three separate storage conveyors.

Second-Stage Work — With primary work completed, actual fabri-

COLD WORKED: At the top of the ram stroke, the web material is stressed beyond its elastic limit.



IN MOTION: An elevator places the joist on a conveyor, after it's stripped from the welding station.

cation of the joist begins. This takes place on either of the identical joist welders.

Storage conveyors on these machines feed the parts laterally. They also space them out.

A three-position rotary preloader picks off the web in its first position. Then it picks off and correctly positions the top and bottom chords in its second position. Thus, the components enter the loader as a unit.

The loader holds the oriented parts tightly and deposits them in the welding station. In this station, from 5 to 45 individual welding heads — depending on the number of panels in the joist — center on the weld areas. Clamps secure the joist elements in the welding station.

Group Firing — Welding heads fire in cascaded groups. Even the longest joists, up to 55 ft, require less than 3 seconds for completion of all web-chord welds.

Partially completed joists eject out of the welding station onto an elevator. The elevator lowers these joists to a run-out conveyor. This conveyor transports the free-standing joists to the final welding machine.

Automatic positioners place the joists in the final welder. Positioning speeds the assembly of the diagonal-end chords and the bearing plates. This completes the fabrication cycle.

Carriage Station — The welders have identical mirror-image work stations at each end. One of the stations is fixed: The other is mounted on a carriage that rolls on rails to match the different joist-span lengths.

Design of special electrodes and integration of automatic operations help the guns to spot-weld the end chords to the top and bottom joist chords. These same guns projection weld the bearing plates to the end chords. Magazines automatically position all bearing plates.

After the plates are welded, the completed joist is automatically unloaded and placed on a roller conveyor for high-speed delivery to the paint department. The joists stand freely on this conveyor.

Individual Stops—Each piece of equipment in the line has set-up adjustments to restrict the movement of the parts that it handles. Gages, stops, crowding rolls, equalizing guns and self-centering heads locate all parts, before operations begin. These controls maintain alignment while work is in progress.

End result of this capital investment by the joist fabricator is a big boost in productivity. An equally dramatic decrease in production costs is a second feature.

In the past, a major portion of the cost of open-web steel joists has centered on fabrication methods. Angles, rods and bent webs were previously set up in a jig; then each point of contact was individually and manually welded. This required several man hours of work for a typical joist. Compare this old method to the joist-per-minute rate of the integrated line.

Reprints of this article are available as long as the supply lasts. Write Reader Service, The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

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Explosive Forms Aluminum Door

Shaped Charge Produces Part for Aerospace Use

Explosives can forge simple, one-sided parts—of almost any size—to close tolerances.

Each explosive charge serves a dual role. It replaces both forging press and male die.

■ Explosives have a great future in metalworking. They can be used to forge parts—of almost any size—to close tolerances.

Explosive forging of aluminum provides a case in point. This forging method is most useful when it's applied to short work runs of simple, one-sided parts.

In forging with explosives, many factors must be considered. These factors include: type, size and shape of the explosive; distance between the bottom of the charge and the top of the forging stock; die material and design; and the container shape.

To obtain reproducible results, all these factors must be controlled.

Aerospace Parts — Explosives have been used to produce high-quality, aluminum-alloy forgings for both aircraft and missiles. The cost of this explosive-forging equipment is low. In fact, it's lower than the capital outlay needed to make conventional forgings.

However, capital outlay doesn't cover the entire expense picture. There's another factor to consider. Currently, the overall operating costs for explosive-forging processes are high.

Fabrication methods vary. Every part design calls for changes in the explosive-forging process; but there are a few concrete rules.

A tough, hardened steel die is needed. Just prior to detonation, a lubricant should be sprayed on the die. Of course, when forging with explosives, a male die isn't needed.

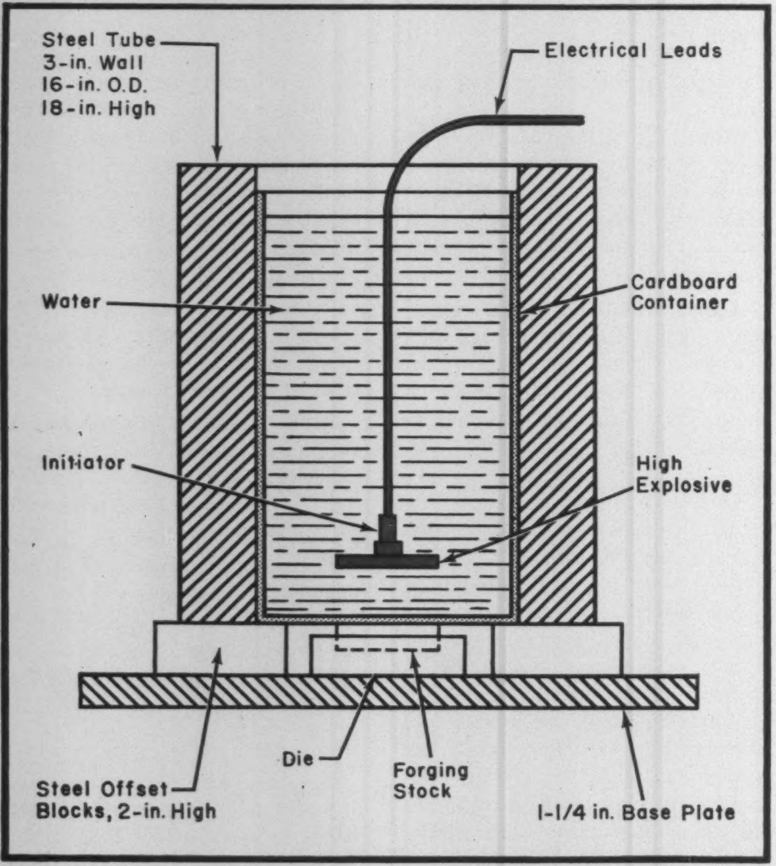
Serves Dual Role—The high explosive takes the place of both the forging press and the male die. It must produce predetermined forces at a short stand-off distance. This stand-off distance is the distance between the bottom of the charge and the top of the forging stock.

Geometry of the reflected forces must approach that of the part being formed. For this reason, simple one-sided parts are most easily forged.

Recently, the Special Projects Dept. of the American Potash & Chemical Corp., West Hanover, Mass., investigated explosives as a means of forging aircraft and missile parts. This work was done to check out manufacturing methods for the U. S. Air Force.

Among the parts forged were low-relief access doors and structural members made of integrally stiffened skin. These small parts were made from aluminum alloys 7075 and 2014.

Forge Access Doors—Aluminum alloy 7075-0 is used for most of the access doors. This material is received in plate form, after it's



GENERAL SETUP: Water surrounds the explosive and transmits force to the forging stock. The stock-and-die assembly rests on a base plate.

forged from bar stock. Starting shapes are oval, 3 x 6 x ⅝ in. thick. Each oval contour is 1/16 in. smaller than the oval contour of the die cavity.

Forging takes place in two stages. Therefore, two female dies are used. Both dies are made from 4130 steel, hardened to Rc 16.

The first-stage die is 9 x 9 in. x 50 pct of the final shape's depth. The second stage die is also 9 x 9 in. It's depth is 0.35 in. Thus, the second-stage die has a depth that equals the actual part-forming depth.

Exactly 103 g of tetryl—or Trona 502—serves as the explosive. The charge is shaped into the same oval pattern as the forging stock. This geometry produces uniform pressure on the oval stock.

Optimum stand-off distance is 2 in. A longer distance would decrease the depth of the forging. Shorter distances cause die damage.

Water Transmission—Water surrounds the charge and transmits the explosive force to the stock. For economic reasons, water is normally chosen. However, any liquid that has a density close to that of water also produces good results.

Peak pressures applied to the forging stock are in the range of 90,000-150,000 psi. The duration of the applied pressure is from 2-5 milliseconds.

Just prior to detonation, the die must be lubricated. Use of a 50-50 mixture, by volume, of M-6 oil and Forging Compound No. 2342 frees the parts after forging. M-6 oil has a 100-second viscosity. The forging compound is essentially colloidal graphite. Both of these products are made by the White & Bagley Co.

After detonation, the forgings are cleaned in a pickling solution. Cleaning doesn't present any problems. First the part is placed in a 10-pct solution of caustic soda. It remains in this bath for 15 minutes; then it's washed off.

Quick Dip—Next, each forging is dipped in a 30-pct solution of nitric acid for about 30 seconds. Then, it's again washed off.

Follow Step-by-Step Method

1. **Place forging stock on lubricated die.**
2. **Put assembly in 500°F furnace for ½ hour.**
3. **Place explosive charge in container.**
4. **Fill container with water.**
5. **Place stock-and-die assembly under container base.**
6. **Detonate the explosive charge.**

NOTE: Omit step 2 for ambient - temperature forging.

Note Strength of Forged Door

ALLOY 7075	YIELD STRENGTH, psi	TENSILE STRENGTH, psi	ELONGATION, pct
As forged (ambient)	45,200	51,600	4.0
As forged (at 500°F)	28,500	37,100	10.0
After heat treat (ambient)	73,000	81,200	12.0
After heat treat (500°F)	70,300	78,600	10.0

NOTE: Parts were erroneously heat treated for alloy 2014.

Heat treatment for the access doors, made from alloy 7075, doesn't take long. The forged doors are heat treated at 880°F for 3 hours with a 140°F water quench. To finish up, the forgings are aged at 250°F for 24 hours, then they're air cooled.

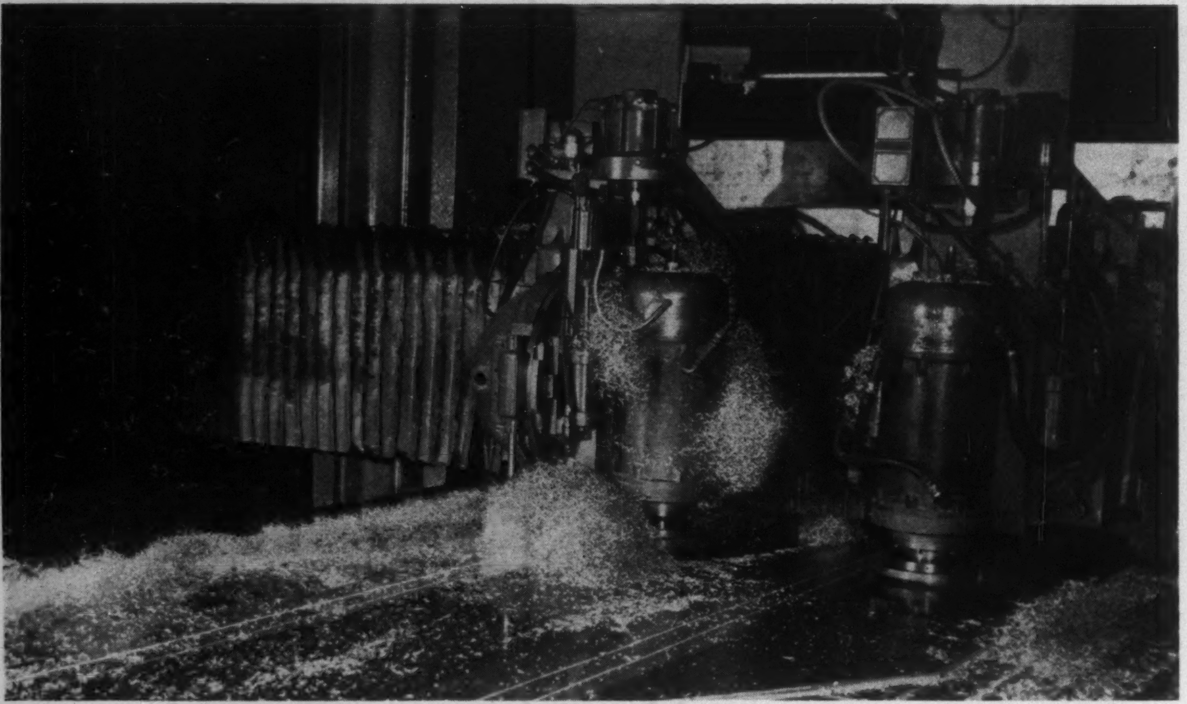
When alloy 7075-0 is used, the properties of explosive-forged doors are better than those of conventional forgings. Average mechanical properties appear in table form. Microstructures are also normal, with fine recrystallized grains.

Explosive-forged access doors, made from aluminum alloy 2014, also have good strength. Two of these doors were analyzed, after explosive forging at 800°F, and heat treatment to the T-6 condition.

Properties of these doors are like those of conventional forgings made from alloy 2014. Actual values include: tensile strength, 70,900 psi; yield strength, 62,400 psi; and 7.3-pct elongation. These are average figures.

Deep-Draft Problems — Test results with the integrally stiffened skin varied. No complete unit was 100-pct forged. Center portions were completely forged at 800°F, but the outer sections were only partially forged. In some cases, the outer sections broke off from the center during forging operations.

This shows that deep forgings, with no draft, are almost impossible to make by explosive-forging methods. Why? Because deep-draft parts require a flowing of the metal —instead of a quick shaping as in low-draft forgings.



WITHOUT CHIP REMOVER—Skin mills generate large amounts of chips which vary in size and shape.

Chip Remover Accents Safety

Vacuum Units Collect Refuse Directly From Machined Surfaces

By **G. D. Gibbons** and **J. A. Elder,** Convair, Fort Worth

Chips, both flying and standing, are problems to most machine shops.

A well-designed removal system is now cutting down on accident rates and saving hundreds of manhours at a major airframe plant.

▪ Machine shops, country wide, with their electronic brains and numerical controlled tape equipment, are found knee-deep in generated chips rather than the proverbial clover. Enormous rates of stock removal are found in even the more modest machine shops.

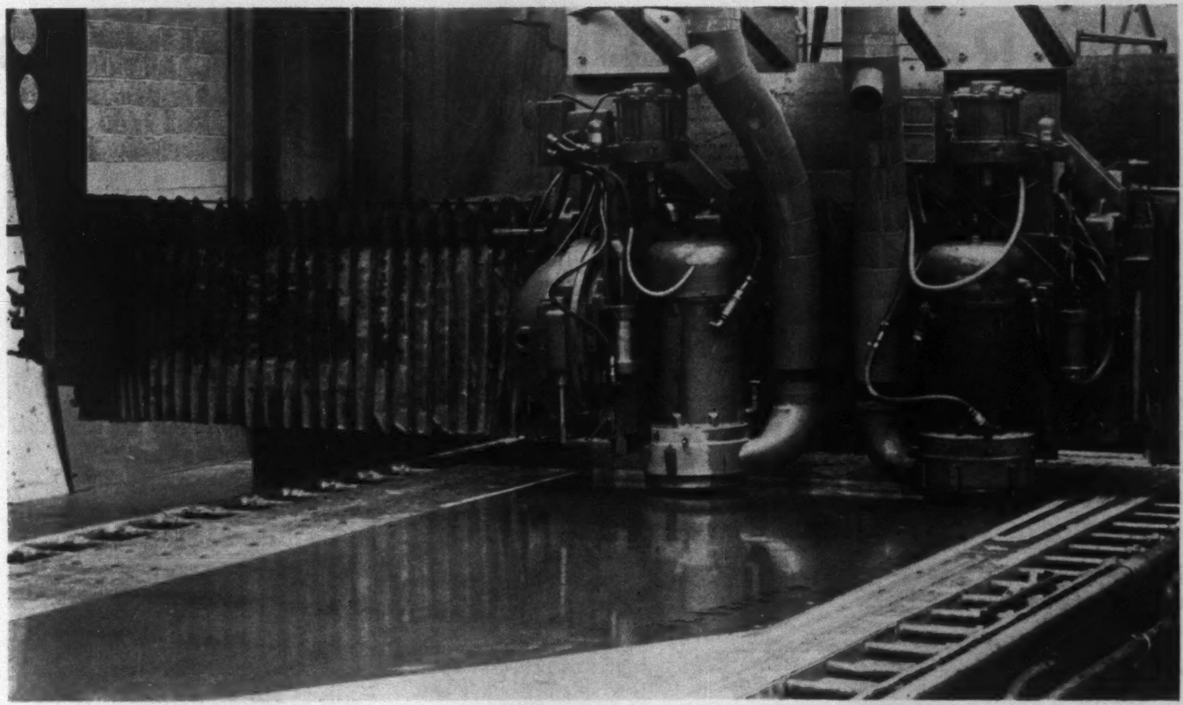
The result of this buildup of chips is hundreds of manhours spent to air blow, wipe, sweep, shovel, haul and process this salvagable refuse. To end its problem, one company, Convair, Fort Worth, had its manufacturing research engineers develop a unique chip disposal system for milling operations.

Major advantages of the new system's design is adaptability for installation in almost any shop at any time. It is fully automatic, requiring no manual operation in its collecting cycle.

Uses Chip Nozzles—The chip removal system literally vacuums the chips from the machine through a head and ducting system into a hopper outside the machining area.

Chip nozzles are attached to each machine head, picking up the chips as they are generated. The Giddings and Lewis skin mill system differs from that used with other machines because of the type of chip it produces. Chips generated by the 12-in. diam face mill on this machine are long, stringy and excelsior-like.

It is a very difficult chip to vacuum and deposit in a hopper. This situation was met with an impeller attached to the machine spindle. A vained-type nozzle is attached to the machine motor housing allowing chips to be pulled



CHIPS ELIMINATED—The chip removal system vacuums the chips from the machine directly into a hopper.

through the vains in the nozzle housing.

Chops to Smaller-Sizes—The impeller chops the chips into shorter lengths and pushes them into the ducting system. Here, they are picked up by a blast fan which creates air velocities equal to a 90-mph wind. The fan is mounted on the side of the hopper outside of the building. By locating the fan units near the hopper, in-plant fan noise is eliminated. A minimum of floor area is required for this portion of the automatic collecting system.

Stops Radial Movement — The chip type produced by the G&L and Morey tape-controlled machines and the Ekstrom-Carlson Cavro mills are made by end mill cuts. This chip picks up easily with a unique nozzle developed for each type of machine.

Chip capturing velocities created in the nozzles are extremely high. The radial movement of the chips, as it is generated, is stopped by a wall of fiber brushes attached to the lower section of the collector nozzle.

At this point, the nozzle velocity created by the blast fan acts against the chip and exhausts it into the cyclone units at the top of the hoppers. Here, air is exhausted and chips are deposited in the hopper.

Where's the Coolant? — Coolant used in machining is a fine mist of soluble oil and water. A minimum amount of this mist is carried off into the duct by the chips.

Because of the rapid chip movement through the duct system, it air dries by the time it reaches the hopper. This eliminates the coolant drain-back problem at the hopper.

If an oil mist coolant is used, the coolant will cling to and follow the inner walls of the duct. A diffuser was developed and installed in the vertical section of intake duct, near the chip collecting nozzle.

The diffuser traps the excess oil and returns it to the machine. This stops oil dripping at duct joints and draining back from the chip collection in the hopper.

Accent on Safety—The automatic collecting system decreases the safety hazards of flying chips and oil slick floors. Ninety pct of the eye injuries received from flying chips, even though safety glasses are required in the area, are eliminated. Normal flying chips are reduced by about 99 pct.

On many high chip producing jobs, operators are compelled to wear heavy shop coats and face shields to protect exposed body areas from chip penetration.

All jobs of this nature were considered unsafe and disliked by the operators. With the captured chip system and the oil slick floors disappearing, accidents will be greatly reduced.

Why Not Remelt—The chip removal system registers a manhour savings on an estimated 1,133,496 lb of chips per year. Additional savings are possible with a small automated foundry installation.

Chips and solid aluminum scrap can be transformed into tooling plate and fixtures. The control of the quality and purity of scrap for the ingot is maintained by drawing alloys into earmarked hoppers.

Gas Reactions Play Key Role In Iron-Pellet Reduction

By **J. Huebler**—Supvr., Research Section, Surface Combustion, a div. of Midland-Ross Corp., Toledo.

Carbon monoxide and hydrogen serve as the active reducing gases in direct-reduction and magnetic-roasting processes.

When reduction occurs, these gases combine with undesirable elements in the iron ore.

■ Many elements play vital roles in the reduction of iron ore. Hydrogen, carbon and oxygen are present in the gas phase. In the ore, carbon, silica, aluminum, magnesium and many other elements are often present—in addition to iron and oxygen.

Unless the reduction temperature is high enough for slagging reactions to occur, the only elements which are of chemical concern are iron, oxygen, hydrogen and carbon.

However, from a physical standpoint, the gangue materials have a pronounced effect on the kinetics of reduction. These gangue materials include silica and alumina.

Reduction Pattern—It might be worthwhile to follow a hypothetical reduction process. Let's begin with hematite and excess oxygen at 1700°F. Assume this process takes place in such a manner that all parts of the ore are of one composition. Let us also assume that all parts remain at equilibrium.

As oxygen is removed, there is no effect—until all the free oxygen is gone. Further removal of oxygen causes magnetite to form. As more magnetite forms, the amount of hematite decreases.

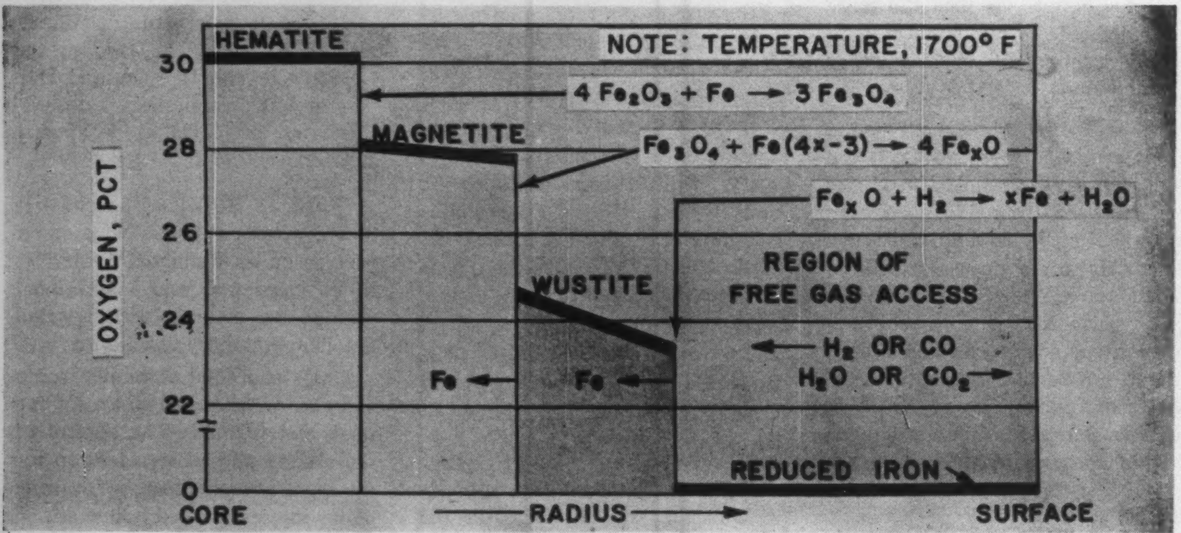
Further removal of oxygen reduces the amount of oxygen that is in solution. Wustite forms. Formation of the wustite reduces the amount of magnetite present.

In this region, as in the hematite-magnetite region, wustite and magnetite exist as a mixture. However, when enough oxygen is removed, all the ore becomes wustite.

Gamma Iron — Reduction of wustite changes its composition. Further reduction forms gamma iron in a mixture with the altered wustite. Continued reduction forms more and more gamma iron. The amount of wustite grows smaller and smaller until the composition is all gamma iron.

If the reduction process takes place at a temperature below 1100°F, wustite doesn't form. Magnetite will occur, but only as the

Check Steps in Direct-Reduction Process



stoichiometric compound Fe_3O_4. In this case, the reduction process moves from hematite to a mixture of magnetite and hematite.

Further reduction forms all magnetite. Then a mixture of alpha iron and magnetite is formed. Finally, the composition becomes 100-pct alpha iron.

In the foregoing examples, the reduction of iron oxide was portrayed hypothetically. We did not consider any reducing mechanism.

Reducing Gases—In actual practice, reducing gases are used. These gases are hydrogen and carbon monoxide. When reduction occurs, hydrogen combines with the oxygen of the iron oxide. This forms water vapor.

Carbon monoxide also combines with the oxygen to form carbon dioxide.

When reduction takes place with carbon monoxide at 1700°F, the ore is reduced to gamma iron. This gamma iron then becomes carburized to form austenite. Austenite is a solid solution of carbon and gamma iron.

If the ratio of carbon dioxide to carbon monoxide is low, the carburization of gamma iron continues until the limit of solubility is reached. At this point, free cementite forms. The cementite occurs as a physical mixture with saturated austenite.

Forms Ferrite Solution—Reduction with carbon monoxide at lower temperatures is more complex. In the range of 1300°-1400°F, carburization of alpha iron results first in a solid solution known as ferrite. Further carburization forms a mixture of ferrite and austenite.

As carburization proceeds, more and more austenite forms. This continues until the body is 100-pct austenite.

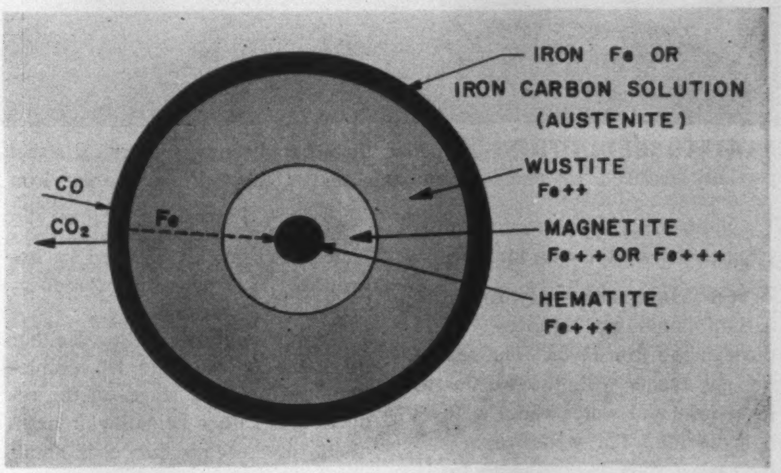
Further carburization produces more carbon in solution in austenite. When the solubility limit is reached, free cementite forms. The cementite forms as a physical mixture with saturated austenite.

Oxygen Removal—It's easier to understand the reaction process if we develop a picture of how oxygen is removed. Consider the figures that appear with this text.

These figures show how the oxygen percentage varies from the core to the surface of a partically-reduced grain of hematite. A layer of magnetite surrounds each hematite core. The magnetite is covered by layers of wustite and completely-reduced iron.

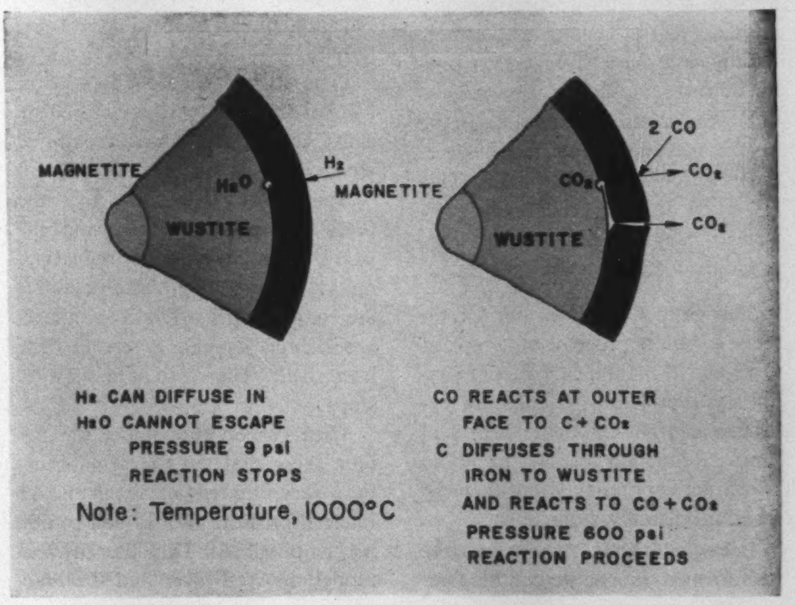
If the reducing gas contains carbon monoxide or methane, the iron layer will contain carbon. The outer layer may be a complex mixture of ferrite and austenite. Even cementite may be included in the outer layer.

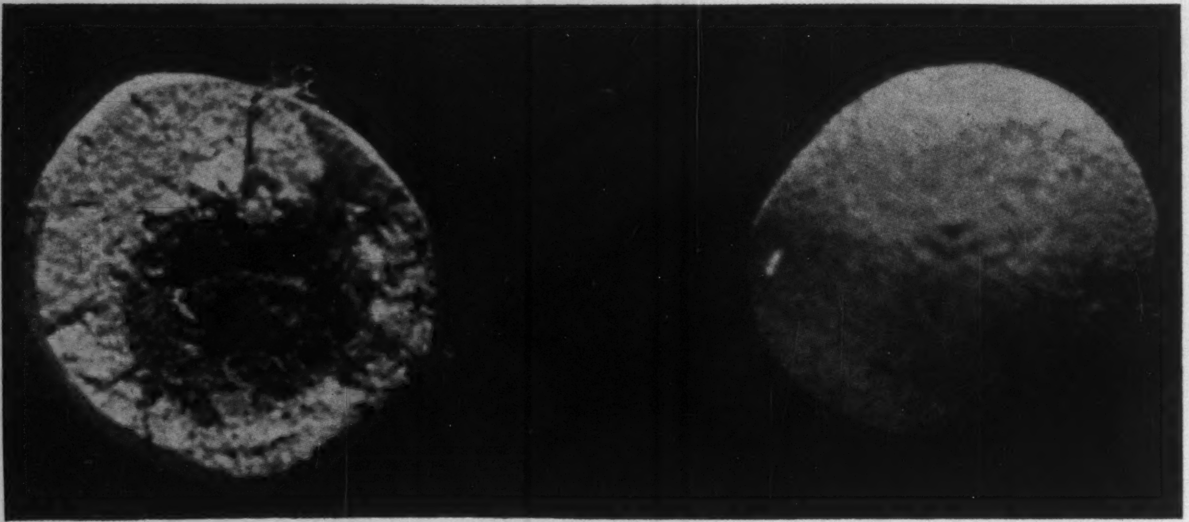
The iron layer is porous—except when magnetite is reduced by hydrogen. Porosity allows free access of the gas from the outside of the


IRON Fe OR
IRON CARBON SOLUTION
(AUSTENITE)
WUSTITE
Fe++
MAGNETITE
Fe++ OR Fe+++
HEMATITE
Fe+++
CO
CO₂
Fe

OVERALL STRUCTURE: Partially reduced hematite pellet or grain is composed of several layers. A layer of magnetite surrounds the core.

Magnetite Reduction Is Rapid


MAGNETITE
H₂O
H₂
WUSTITE
MAGNETITE
CO₂
2 CO
CO₂
CO₂
WUSTITE
H₂ CAN DIFFUSE IN
H₂O CANNOT ESCAPE
PRESSURE 9 psi
REACTION STOPS
Note: Temperature, 1000°C
CO REACTS AT OUTER
FACE TO C+CO₂
C DIFFUSES THROUGH
IRON TO WUSTITE
AND REACTS TO CO+CO₂
PRESSURE 600 psi
REACTION PROCEEDS



PARTIAL REDUCTION: A pellet that has been partially reduced by carbon monoxide shows topochemical structure. Note the sharp boundary between the outer iron shell and the unreduced oxide.

grain to the wustite-iron interface.

Free Movement — Hydrogen or carbon monoxide moves freely through the iron layer. The reducing gas reacts with the wustite to form iron and water vapor or carbon dioxide. The water vapor and the carbon dioxide then move freely back out of the porous iron layer and into the gas stream. This is how oxygen gets from the ore into the gas.

Within the grain, part of the iron formed at the iron-wustite interface migrates to the magnetite interface. At this interface, it reacts to produce wustite. Further iron migration occurs through the magnetite to the mermatite interface. Here, the reaction forms magnetite. This reduction in the grain occurs by iron diffusion inward—not by oxygen diffusion outward.

Magnetite Reduction—In the direct reduction process, at temperatures above 1100°F, magnetite cannot by completely reduced by hydrogen in any reasonable period of time. Reduction occurs to about 75-85 pct very quickly, but then the reaction virtually stops.

Below 1100°F, where wustite isn't formed, magnetite can be completely and quickly reduced by hydrogen. Hydrogen also reduces hematite without difficulty.

Carbon monoxide reduces either magnetite or hematite to completion. In the early stages of the reduction of either hematite or magnetite, the reaction proceeds about two to five times as fast with hydrogen as it does with carbon monoxide. This is as expected. Hydrogen diffuses faster than carbon monoxide.

Bogged Down—Here's why the reaction quits when magnetite is reduced by hydrogen.

Only slight lattice changes occur from magnetite to wustite to iron. Thus, the reduced iron outer layer which forms is very tight.

The illustrations show that the pressures which occur inside the iron shell, with hydrogen reduction, are very low. Often, these pressures are only 9 psi. These pressures aren't high enough to rupture the iron shell. Therefore, the reaction stops.

With carbon monoxide, the figures show that the reaction occurs by a very different mechanism. An internal pressure of as much as 600 psi is possible. This literally explodes the iron layer and the reaction proceeds to completion.

When hematite is reduced to magnetite, a pronounced lattice change occurs. The iron layer that's formed is very porous. Thus, the gases have free access to the wustite interface.

Pebbles and pellets are collections of grains. During reduction, the same type of layered structure develops as in the case of individual grains. However, the mechanism is quite different.

Rates of Reduction—Reduction rates for pellets depend upon their structure and size. Under 0.4-in. diam, reaction velocity is reported to be independent of size. From 0.6- to 0.8-in. diam, the rate is inversely proportional to the radius. Over 1.2-in. diam, the rate is inversely proportional to the radius squared.

Porosity is known to be a vital factor. As completion of the reaction approaches, the presence of impurities bears a large influence on the reaction rate. Why? Because the impurties tend to prevent contact between the gas and the iron oxide.

In all cases, the rate of reduction is directly proportional to the partial pressures of the reducing agents that are present.

Zirconium Production Hits Peak As Reactor Needs Ascend

By **J. R. Driear**—Senior Engineer, Westinghouse Electric Corp., Cheswick, Pa.

Continued demands for more zirconium have taken it from the rare-metal realm.

High production methods keep the supply line flowing.

▪ Zirconium, once termed a rare metal and available only by the pound, can now be obtained by the ton. The metal has found extensive use in the nuclear-reactor industry as a cladding material.

The cladding application led to new processing techniques which enable the metal to be produced on a production-line basis. Forged and extruded shapes, hot- and cold-rolled plate and strip, rolled bars and cold drawn tubing are all successfully fabricated in large lots.

Most zirconium used as melting stock is supplied in the form of sponge from the Kroll magnesium-reduction process. Recently, chunklet zirconium made by induction melting of sponge from a continuous sodium-reduction process has come into use.

Close Control—The composition of the bulk of zirconium melting stock is controlled to very close limits. The approximate 2½-pct hafnium which occurs naturally with zirconium is usually removed during the sponge-making process.

The hafnium must be removed, because of its high neutron cross section, from sponge destined for conversion to shapes used in nuclear reactors.

The majority of zirconium ingots are produced today as an alloy of zirconium with tin, iron, nickel and chromium. This alloy, Zircaloy-2, is widely used in nuclear reactors.

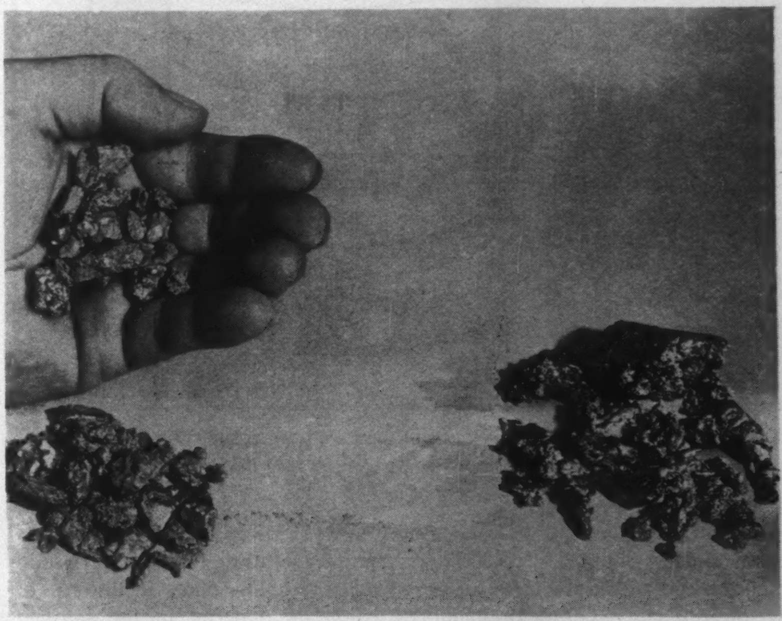
Compressed into Bars — Zirconium sponge (or chunklets) is mixed with alloying elements and scrap, and pressed into bars. Alloying elements are commonly electrolytic metal powders.

The powdered alloys are pressed into pills or cake so they can be retained in the compacted sponge bars without sifting out in subsequent handling. Scrap, such as turnings, is crushed to break up continuous chips. After degreasing and a run through a magnetic separator to remove tramp iron, the scrap is ready to mix with sponge.

Mill scrap is cut into pieces less than ¾ in. in all dimensions. It is then particle blasted and pickled to remove mill scale. Next, it's run through a magnetic separator. Finally, it's hand sorted to prepare it for mixing with sponge.

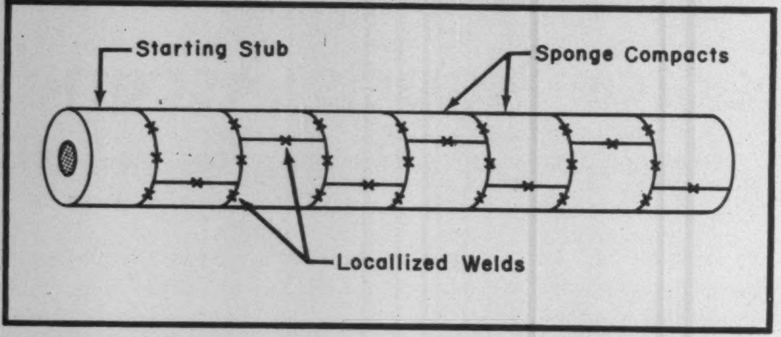
Forming Compacts — Sponge compacts are formed by pressing the sponge scrap, alloy mixture in closed dies at pressures ranging upward from 112,000 psi. Protuberances on sponge particles interlock during pressing. This produces a compact that's strong enough to withstand subsequent handling.

Sponge compacts, commonly weighing 17-40 lb, are made in shapes which can be locally welded together to make a first-melt consumable electrode. Normally the electrodes range from 5-6 in. in diameter with lengths up to 24 ft. However, one company has developed a process for pressing



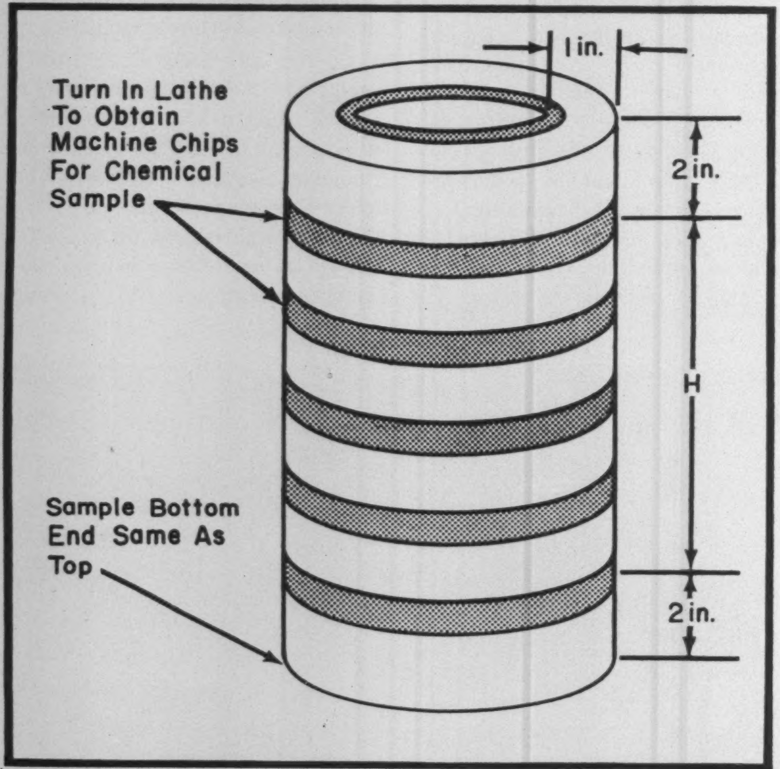
USES BOTH FORMS—Sponge zirconium on the left and chunklet zirconium on the right are both mixed with scrap and pressed into cakes.

Typical First Melt Electrode



WELDING INGOTS—The compacts are welded under an atmosphere of argon or helium using a consumable electrode of zirconium or its alloy.

How Chemistry Is Controlled


1 in.
Turn In Lathe To Obtain Machine Chips For Chemical Sample
2 in.
H
Sample Bottom End Same As Top
2 in.

UNIFORM CHEMISTRY—Careful distribution of alloying elements is maintained by checking the ingot at definite points depending on its height.

compacts up to 365 lb. This eliminates much welding.

Localized welds are made under an atmosphere of argon or helium using a consumable electrode of zirconium or zirconium alloy. Welds made by the non-consumable technique, using tungsten or carbon electrodes, produce inclusions of electrode material in the finished ingots. As a result, this process has been discarded.

First-Melt Ingot—The welded first-melt electrode is joined, again by consumable arc welding, to a starting stub made of a zirconium alloy. This stub, which is not usually melted and is reused, serves as an adapter to join the first-melt electrode to the stinger (negative electrode) of the arc furnace.

Melting is done in a cold-hearth consumable arc furnace of conventional design under dynamic pressures of 300-microns Hg or less. First-melt ingots, 10-12 in. in diameter, weigh about 1000 lbs.

After the ends are squared off, first-melt ingots and starting stubs are joined together by consumable electrodes. The ingots are welded under an atmosphere of argon or helium to make a second-melt electrode.

Keeps Careful Balance—As with the first, the second-melt electrode is melted in a cold-hearth arc furnace at pressures below 250-microns Hg. A careful balance must be maintained here because very low pressures cause poor ingot surface.

Higher pressures increase the chance of internal porosity in the ingot. Shrink is also held to a minimum by reducing arc power and adjusting furnace pressure near the end of melting.

Ingots with 12-in. diam, weighing 1100 lb, have no shrink. The larger diameters, weighing 2000 lb, have shrinkage no larger than a marble.

Second-melt ingots are machined to remove the porous surface layer formed in vacuum arc melting.

Close Chemistry Check—Homogeneity in the final ingot depends on careful distribution of alloying elements and scrap in the first-melt electrode. For this reason extensive sampling for chemical analysis is done on the ingot.

In addition, the ingot is ultrasonically tested for presence of voids over 5/64-in. diam.

Conversion of the zirconium ingots into various mill shapes takes place without much difficulty.

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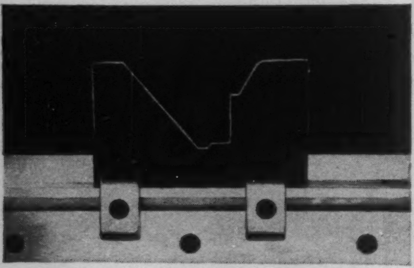

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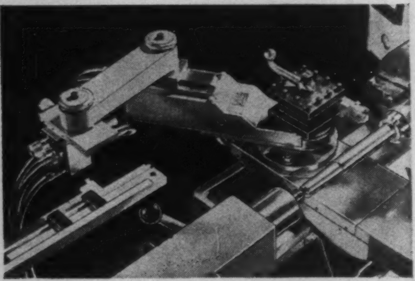

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Compares to Steel

Nodular iron, H. K. Ihrig (assigned to Allis-Chalmers Mfg. Co., Milwaukee), Aug. 9, 1960. Method of making an as-cast modular graphite ferrous metal composition. It does not contain nickel, copper, or cerium in the as-cast state and has a tensile strength, yield point, and ductility similar to steel. No. 2,948,605.

Ore Reduction

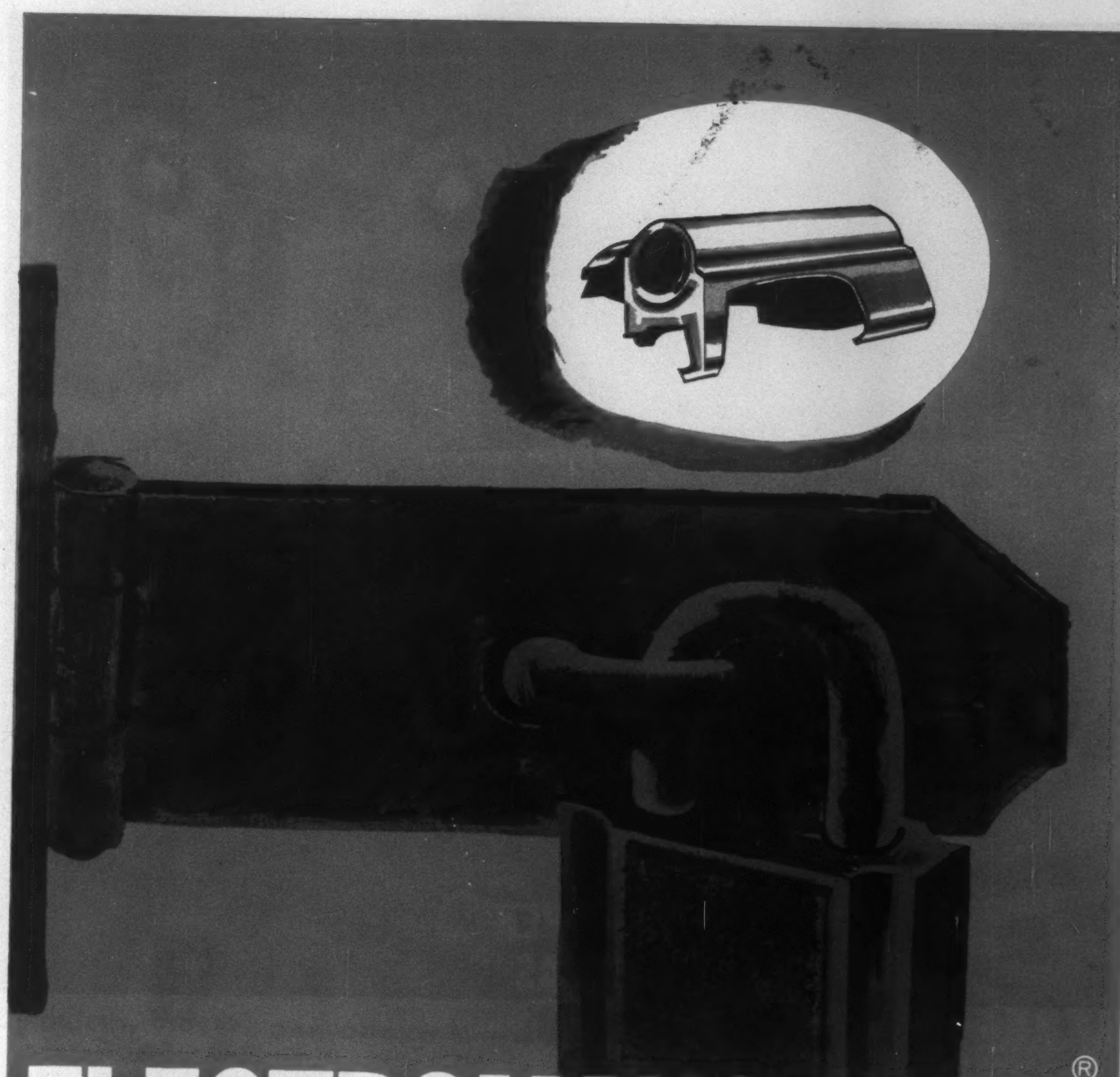
Furnace for reducing metallic ores, A. K. Crabill (assigned to E. J. Lavino & Co., Philadelphia), July 26, 1960. Design for a furnace for reducing iron oxide ores, mixed metal oxide ores, and the like. A finely-divided ore and a carbonaceous material are intimately mixed and subjected to heat and pressure to reduce the metal oxide. No. 2,946,581.

Clean Burner Ports

Apparatus for cleaning soaking-pit burner ports, E. W. Haeckler (assigned to U. S. Steel Corp., Pittsburgh), Aug. 16, 1960. A drill and reamer removes accumulations of slag and cinder, from burner ports, in vertically-fired soaking pits. No. 2,948,909.

No Slag Formation

Method and composition for combating slag formation on refractory surfaces, H. Thompson (assigned to Nalco Chemical Co., a corp. of Del.), July 26, 1960. In a method for preventing slag formation on surfaces exposed to high-temperature gases, e. g. openhearth furnace ports, the refractories are chemically treated to form a coating of magnesium oxide thereon. No. 2,946,703.



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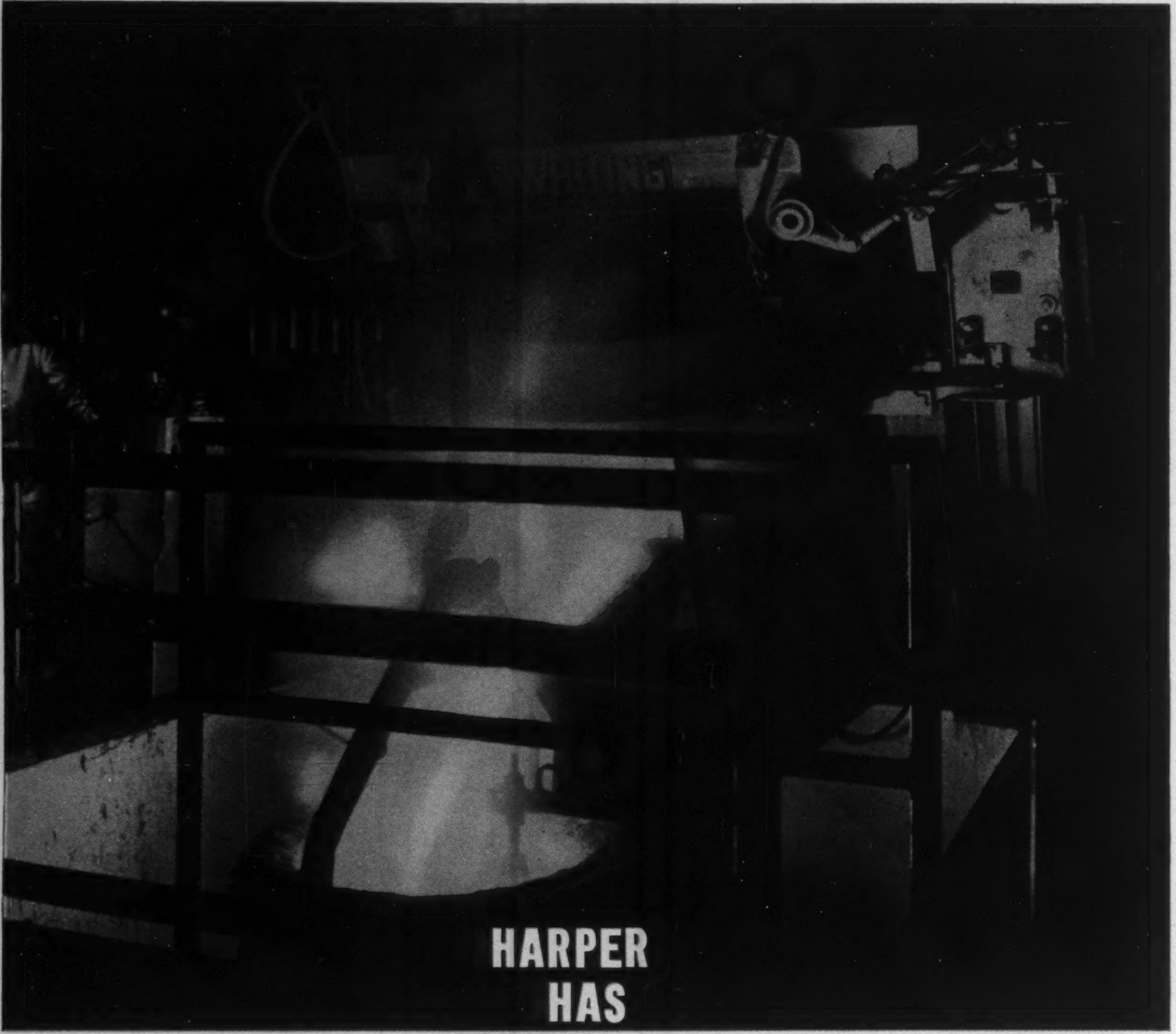

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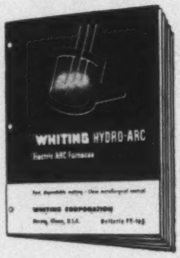

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If you want more details on products advertised in this issue fill in below:

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PLEASE TYPE OR PRINT

Name ....

Title ....

Product Manufactured ....

Company ....

Co. Address ....

....

City .... Zone .... State ....

shows rotor and stator construction and highlights many of the construction details. (Electric Machinery Mfg. Co.)

For free copy circle No. 9 on postcard

Flash Curing

An eight page brochure covers flash curing of foundry molds and cores with carbon dioxide. Advantages of CO_2 flash curing include: elimination of baking and drying; savings in time and space; improve dimensional accuracy; reduction of scrap, core handling and finishing time; plus many others. (Pure Carbonic Co.)

For free copy circle No. 10 on postcard

Pressure Instruments

Pressure instruments are described and illustrated in a two-page bulletin. Measuring mechanisms, indicators, recorders and transmitting devices are included. (Bailey Meter Co.)

For free copy circle No. 11 on postcard

Regulators, Manifolds

Industrial gas regulators and portable manifolds are described and illustrated in a 16-page catalog. This comprehensive catalog includes complete specifications and ordering information for: regulators that are available for use with all industrial gases, and completely-portable manifolds for use with oxygen and acetylene. (Linde Co.)

For free copy circle No. 12 on postcard

Numerical Control

An eight-page brochure completely describes a numerical-control system. The brochure lists the advantages of the new system. Product data and illustrations are provided on all of the modular components, which make up the numerical-control system. (Diehl Mfg. Co.)

For free copy circle No. 13 on postcard

Hydraulic Products

A complete line of hydraulic products for the industrial, marine, and ordnance fields is presented in a 74-page catalog. (Vickers Inc.)

For free copy circle No. 14 on postcard

Plastic Pipe

Consisting of two-pages, a catalog sheet describes the advantages offered by the manufacturer's plastic pipe. Some of the industries using the pipe and some of the common uses are listed. A number of installations are illustrated. (Republic Steel Corp.)

For free copy circle No. 15 on postcard

Tape Analyzer

A four-page color bulletin on an automatic tape analyzer covers all facets of the unit. Method and principle of operation, potential applications and basic specifications for the instrument are included. It also gives design data. (Graver Water Conditioning Co.)

For free copy circle No. 16 on postcard

Jig Boring Machine

A fold-out brochure contains data on a jig boring machine. Listed are its new features, along with its accessories. Illustrations supplement its description. Also included in the brochure are the jig borer's specifications. (Linley Bros. Co.)

For free copy circle No. 17 on postcard

Maintenance Painting

Maintenance painting of industrial plants, machinery and equipment, and commercial and institutional buildings is covered in a 24-page book. It discusses the different uses for various types of primers and finish coats, and shows samples of the colors available. (The Sherwin-Williams Co.)

For free copy circle No. 18 on postcard

Instrument Panel/Dial

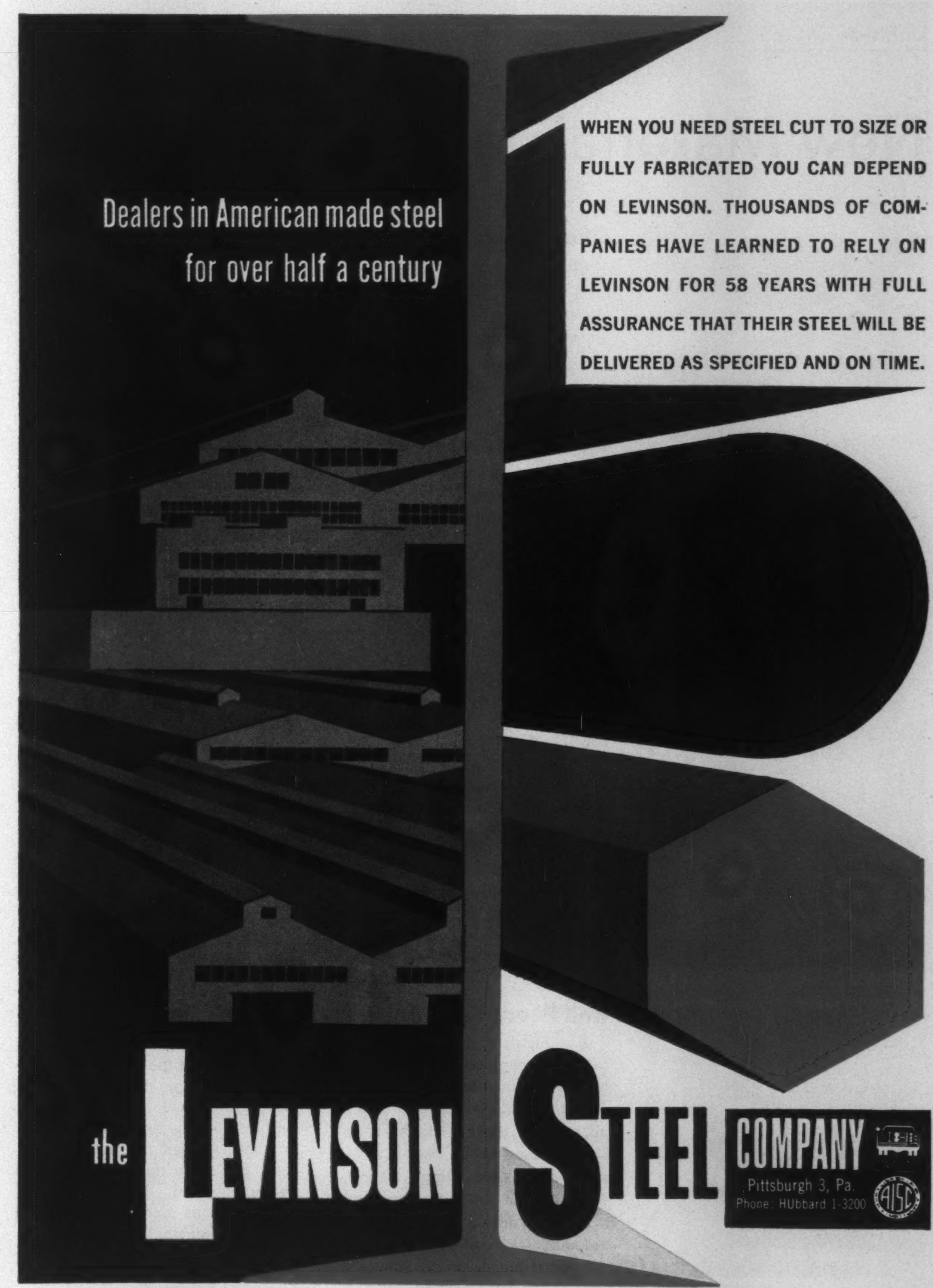
Complete facilities for producing instrument panels and dials, including finishing, engraving and silk screening, are described in an eight-page catalog. The catalog also describes facilities for production or job-lot enameling, painting, iridditing and other finishes to MIL or customer specifications. (Technical Enameling Co.)

For free copy circle No. 19 on postcard

Blowers, Pumps

How a series of horizontal and vertical blowers and gas pumps, automatically provide a metered quantity of oil-free air at constant volume is explained in a bulletin. The 12-page bulletin describes and illustrates the series of rotary positive blowers; the newly-developed series with higher maximum speed ratings and greater outputs. (Sutorbilt Corp.)

For free copy circle No. 20 on postcard



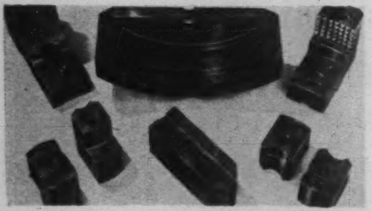
Dealers in American made steel
for over half a century

WHEN YOU NEED STEEL CUT TO SIZE OR FULLY FABRICATED YOU CAN DEPEND ON LEVINSON. THOUSANDS OF COMPANIES HAVE LEARNED TO RELY ON LEVINSON FOR 58 YEARS WITH FULL ASSURANCE THAT THEIR STEEL WILL BE DELIVERED AS SPECIFIED AND ON TIME.

the LEVINSON STEEL COMPANY

Pittsburgh 3, Pa.
Phone: HUbbard 1-3200

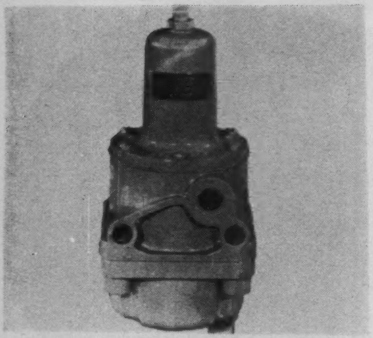
New Materials and Components



Chuck Jaws Provide Increased Production

Custom engineered and custom built, chuck jaws fit any chuck or any lathe, miller, chucking machine or multiple-spindle machine. The chuck jaws give greater machining accuracy. They also offer better holding power of a specific workpiece. The devices have wide acceptance in automotive, missiles and general precision manufacturing. (The Royal Machine & Tool Corp.)

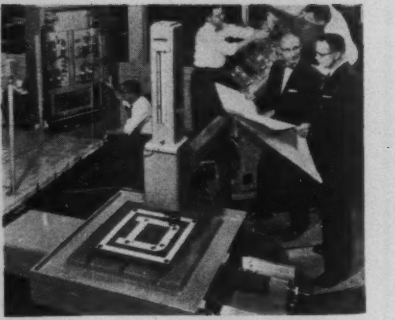
For more data circle No. 25 on postcard, p. 113



Filter Regulator Gives Controlled Supply of Air

A filter regulator is applicable wherever a controlled supply of clean air or gas is needed. It is especially suited for single unit hookups and production equipment, air chucks, instruments and air cylinders. Constructed of pressure diecast aluminum, the regulator has a maximum inlet pressure of 250 psi. Its outlet pressure ranges are: 0-5, 5-35, and 35-100 psi. The filter bowl contains a replaceable filter cartridge made of graded density wool fiber; also, a ⅛-in. drain valve located at the bottom of the filter bowl. Optional construction includes a handwheel adjustment and a ¼-in. side outlet tap for pressure gage mounting. (Meter & Valve Div., Rockwell Mfg. Co.)

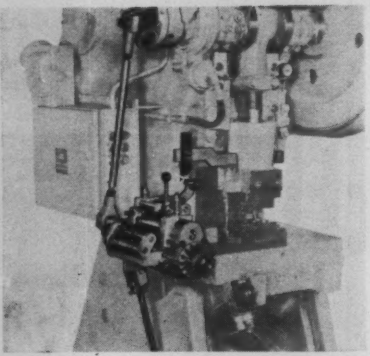
For more data circle No. 26 on postcard, p. 113



Positioning Controls Give 0.001-in. Accuracy

With a repeat accuracy to ±0.005 in., a point-to-point positioning control system directs a wide variety of machine tools. These include: drill presses and boring mills. It is also suitable for multiple axis control. It utilizes punched tape for pre-determining sequences. The system features a linear transducer which is subject to neither wear nor deterioration. The transducer indicates the direction of travel toward the desired positioning point at all times. The positioning system does not require special machine designs. It will operate with virtually any precision machine tool or device requiring accurate positioning. (Square D Co.)

For more data circle No. 27 on postcard, p. 113



Roll Feeds Feed From Side, Front or Back

For high-speed punch-press automatic operation, roll feeds are ruggedly constructed throughout. Roller or ball bearings are used for all rotating parts. The lower roll rotates in sealed ball bearings which never need lubricating. The roll feeds have a top roll release with a lock-out device. The top roll is automatically reset by a starting key that is actuated by the downward movement of the press ram. An unusual feature of the units is the high-speed disk-type brake that has double the usual braking area. A fin-type housing air cools the brake. It allows cooler operation of the feed; less down time for brake lining replacement. The feeds mount directly on the press bolster. Maximum feed lengths range from 2½-12 in. (Cooper Weymouth, Inc.)

For more data circle No. 28 on postcard, p. 113

Mid-States Steel & Wire Co.
Crawfordville, Indiana

Mid-States Diversifies Product Line...

Consolidates Lubricant Inventory!

The past twenty years have seen Mid-States Steel & Wire Company greatly diversify their product line while they simplified their lubricants inventory. Today you would find at Mid-States, banks of nail-making machines pouring out over 35 tons of nails every day . . . new fence-making machines . . . machines producing hardware cloth, ornamental wire, baler wire, wire lath, welded fabric, window guards. The list could go on and on.

While the number of products has grown, Mid-States, with the cooperation of Cities Service Lubrication Engineer "Ken" Mosher, have constantly studied their lubrication requirements and have reduced the number of individual lubricants. Pacemaker oil serves as a hydraulic oil and also as a lubricant on many machines. Cities Service multi-purpose Trojan H grease does triple duty throughout the plant. Cutting oils and other lubricants are held to a minimum by selecting a quality lubricant to serve several applications. Reducing the number of lubricants saves valuable warehouse space and cuts the chance of error in servicing machines.

Call your local Cities Service office for a Lubrication Engineer to show you how you can reduce your lubricant inventory. Or for full information write: Cities Service Oil Company, Sixty Wall Tower, N.Y. 5, N.Y.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

SEE US AT THE IRON & STEEL EXHIBITION, SEPT. 27, 28, 29, 30, CLEVELAND, OHIO

To get the most out of barrel finishing

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS

Barrel finishing cuts unit-cost of deburring from 15¢ to 1¢! How much could it save you?

In one midwest plant, total cost of deburring 20,000 complex aircraft parts by barrel method came to less than $200. This compares with a former cost of $3,000 by hand methods.

This startling reduction in cost is the result of handling hundreds of pieces at a time, instead of grinding each one separately . . . and the result, too, of using the right compound to help the media and barrel do their work.

It's in selecting and supplying the right compound that Oakite helps you get the most out of barrel finishing. Oakite compounds include alkaline and acidic types . . . for steel, brass, zinc die castings, aluminum or alloy parts.

Ask your local Oakite man about barrel finishing, or write for free booklet on barrel finishing to Oakite Products, Inc., 28A Rector Street, New York 6, N. Y.

it PAYS to ask Oakite

OAKITE

over 50 Est. 1909 SCIENCE

years' leadership in industrial cleaning

DESIGN DIGEST

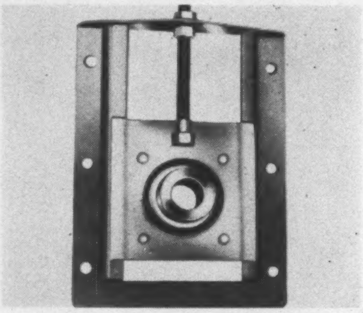
Control Knobs

A complete line of quality instrument control knobs is designed to MS-91528 specifications for military applications. The knobs come in six types, including rounds, skirted rounds, dial-skirted rounds, plain and skirted pointers, and crank-types. Knobs are molded of black Tenite No. 2. (Lerco Electronics, Inc.)

For more data circle No. 29 on postcard, p. 113

Take-up Bearing

Take-up bearing units incorporate inexpensive stamped bearings, which are prelubricated at assembly to give long service life. Laminated neoprene felt seals are used in the bearings, sealing the grease in and the dirt and foreign matter out. Bearings are available in shaft sizes from ⅝-1 in. (Roberts Mfg., Inc.)



For more data circle No. 30 on postcard, p. 113

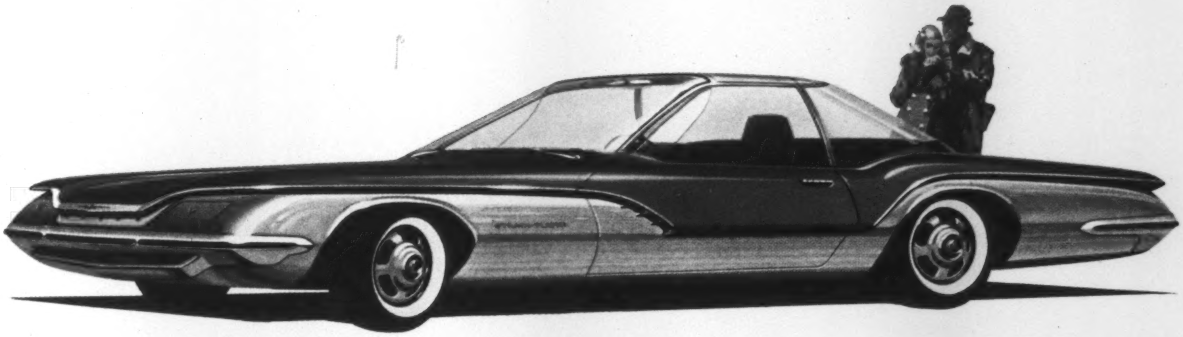
Laminated Plastic

Especially recommended for general industrial use, a flame-retardant industrial laminated plastic has good electrical and mechanical strength. (Synthane Corp.)

For more data circle No. 31 on postcard, p. 113

Locating Pins

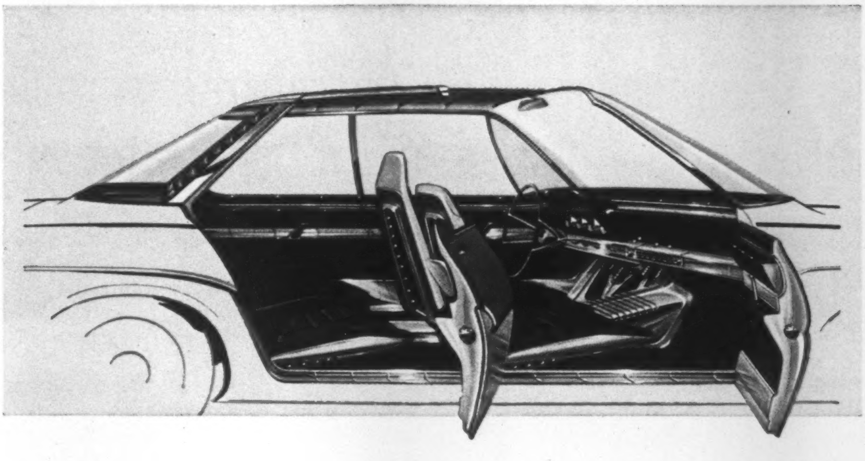
A line of locating pins comes in two styles in a full range of sizes. The pins, manufactured in both diamond and round styles, are designed with a resting shoulder feature that permits the pins to serve as rest pads. The sizes range from ⅛- to 1½-in. head diameters. Both diamond and round shaped styles are carburized, hardened to Rock-



stainless steel

No other metal has the strength, beauty and versatile qualities that serve you so well today and promise so much for tomorrow.

There is nothing like stainless steel for AUTOMOBILES



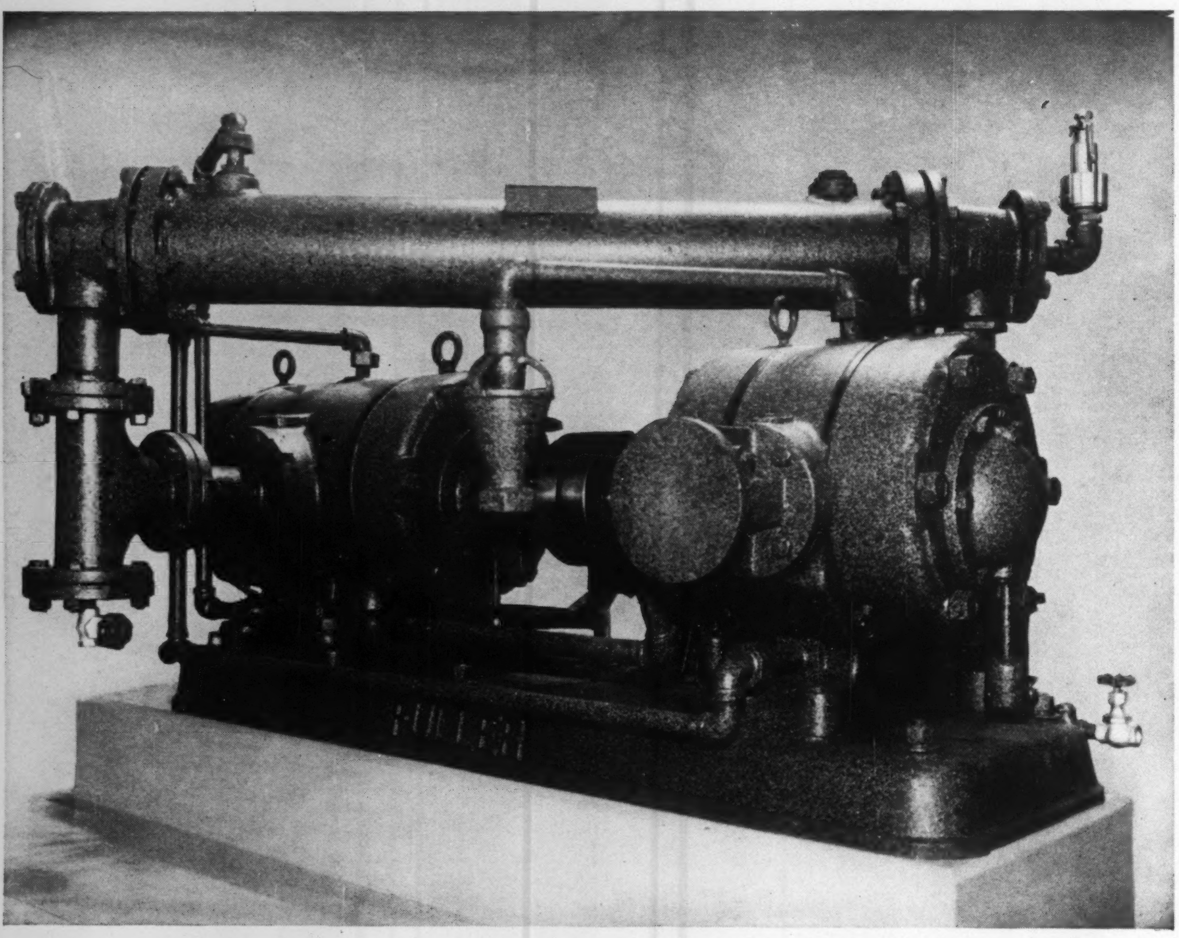
McLouth Steel Corporation,
Detroit 17, Michigan

Manufacturers of high quality
Stainless and Carbon Steels

Stainless Steel

Look for the **STEELMARK**
on the products you buy.

McLOUTH STAINLESS STEEL



Fuller Compressors With Overhead Intercoolers Offer A New Dimension In Compactness

Fuller Rotary Two-Stage Compressors equipped with Overhead Intercoolers fill the bill where space may be a problem. These compressors produce from 30 to 3300 cfm, pressures to 125 lb. gage and can be readily installed.

These compact Rotary Compressors are vibration-free, thereby eliminating the need for involved and expensive foundations or structural modifications.

The Fuller rotary principle permits complete freedom of reciprocating parts—valves, crankshafts, pistons—cutting the need for frequent servicing and parts replacement. Minor maintenance is all the care indicated for years of serviceability.

For full details on the maintenance-free economy and high performance of Fuller rotaries, write today for comprehensive, illustrated Bulletin C-5A.

2626
C359

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
122 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
....pioneers in harnessing AIR

well 60-62 for tough wearing surface with core left mild. The pins are used in bushing applications; also press fitted with lock screw holder. (Jergens Tool Specialty Co.)

For more data circle No. 32 on postcard, p. 113

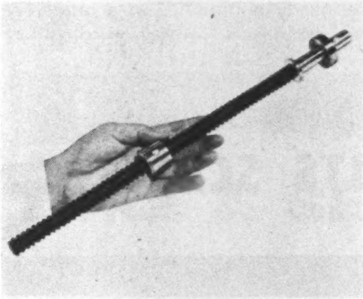
AC Power Supply

Designed for test applications, a high-voltage ac power supply features overload protection and zero start lock-out relay. It also features input and output amperes and output voltage metering. (Light Electric Corp.)

For more data circle No. 33 on postcard, p. 113

Anti-Friction Screw

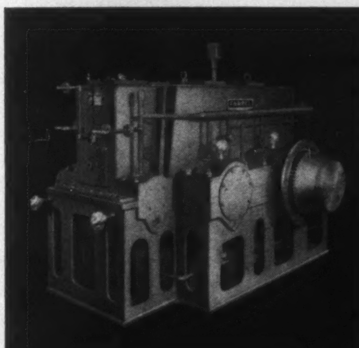
An anti-friction screw features only four threads per inch. Designed for original equipment use, it will hold any elevated load such as a grinding head, chuck or jack, without slipping or counter-rotating. It offers pitch accuracy of 0.001 of an inch to 1 in. of travel. The hazard of dropping an elevated load due to a stripped thread is completely eliminated. The screw permits more rapid positioning of the load and lessens operator fatigue. (R. C. S. Tool Co.)



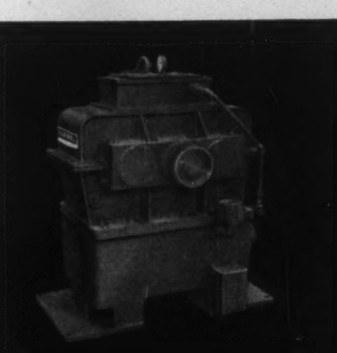
For more data circle No. 34 on postcard, p. 113

Cleaner Buffs

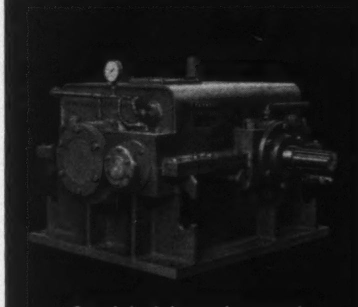
An automatic applicator of liquid buffing and polishing compositions is designed for use with wide buffs where the application of a uniform spray of liquid compound is a problem. The applicator improves liquid compound adherence. This will result in cleaner, faster and more economical buffing and polishing operations. The mechanism



Special reversible high-speed reduction unit, 8,000 HP, 18,000/1,295.5 RPM.



Special speed-increasing unit, 660 HP, input speed range: 1,500 to 3,000 RPM, output speed range: 20,000 to 40,000 RPM.



Special right-angle speed-increasing unit, 600 HP, 2,500/19,932 RPM, with double helical and spiral bevel gears.

Special 375 HP speed-increasing unit, with two speed ranges: 6,000/10,769 RPM and 6,000/15,100 RPM.

TEST-STAND GEAR UNITS

engineered to individual requirements

Here are four examples of Farrel high-speed gear units designed for test-stand service. Each embodies the solutions to a whole series of problems — presented by the customers' individual requirements, and by the high peripheral speeds involved. Each is a challenge in itself.

That such units can be designed for successful operation is due to (1) Farrel's long experience in meeting "extraordinary" specifications for gear units, and (2) the inherent accuracy of the Farrel method of gear generation.

Put this experience to work the next time you need a test-stand gear unit. In the meantime, send for bulletin 451.

FARREL-BIRMINGHAM COMPANY, INC.
BUFFALO, N. Y., Tel. Bedford 3440

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, Akron, Chicago, Minneapolis, Los Angeles, Salt Lake City, Tulsa, Houston, Atlanta
European Office: Piazza della Republica 32, Milano, Italy

FARREL ®

AGMA

FB-1196

features a power drive chain and sprocket device. It permits a wide variation in width of travel and can be used with single or multiple buffing systems. (Frederic B. Stevens, Inc.)

For more data circle No. 35 on postcard, p. 113

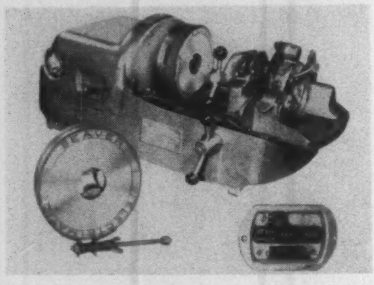
Spray Nozzle

For industrial spray applications, a spray nozzle is recommended for a wide variety of washing, cleaning and flooding applications where flat, low impact spray patterns are required. The nozzle is furnished in a full range of capacities and spray angles. All surfaces are accurately machined and the nozzle has no vanes, cores or other internal obstructions. (Delavan Mfg. Co.)

For more data circle No. 36 on postcard, p. 113

Requires No Chucking

Available on two of the manufacturer's pipe machines, a chuck works automatically from the switch. It completely eliminates the time needed for chucking. The instant the switch is turned, positive grip is insured. It will hold pipe or bolts up to and including 2-in. diam. (Beaver Pipe Tools, Inc.)



For more data circle No. 37 on postcard, p. 113

Pillow Block Bearings

A compact line of pillow block bearings utilizes housings of ductile material. The bearings are designed for light and medium-duty service. Improved retention of lubricant and exclusion of dirt results from the adoption of an improved lip-type seal. Constructed of a rubber impregnated fabric between metal shields, the seals efficiently maintain positive contact with the inner bearing ring at all times, regardless of shaft misalignment. (Hoover Ball & Bearing Co.)

For more data circle No. 38 on postcard, p. 113

Control Relay

Compactness and dependability are the main features of a new type industrial control relay. The relay is rated at 6 amp, 300 v maximum. The unit is a fixed circuit device with provisions for eight independent poles. Specifically tailored to the demands of automation, the relay requires up to 70-pct less panel area than conventional relays. (Cutler-Hammer)

For more data circle No. 39 on postcard, p. 113

Blowers

Two-in. diam blowers employ motor speeds up to 22,000 rpm. Outstanding in the series is a blower which has a "no-stall" characteristic performance curve with a shutoff pressure of 6-in. H_2O and a free-air delivery of 32 cfm. This performance is obtained at a relatively

---

EXECUTIVE REPORT #11

HERE CARBON STEEL SHEDS ITS SCALE

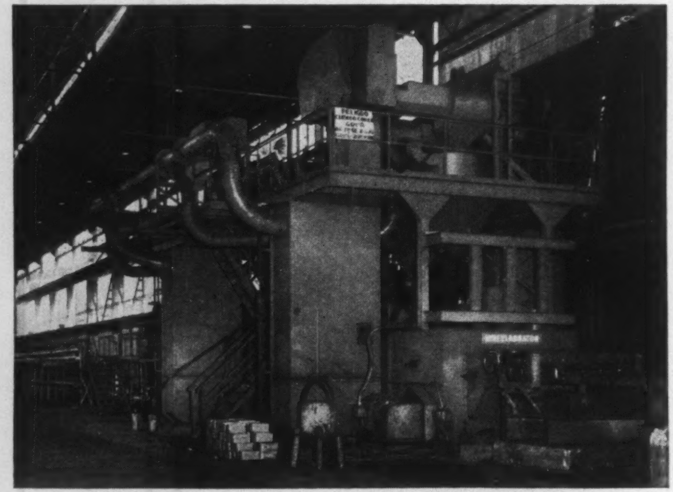
Wheelabrator® Descaling Enables 100% Increase in Production

Every ton of steel produced in the modern mill of Altos-Hornos De Mexico, S.A., at Monclova, Coahila, is run through a Wheelabrator airless blast descaling cabinet. In a typical month, over 15,500 tons of carbon steel from a hot Steckle reversing type mill was Wheelabrator descaled followed by a light pickle rinse. The end product is reduced on reversing cold mills for sale as cold rolled steel, tin plate, and galvanized stock.

Steel is descaled in this new line at a rate of up to 200 f.p.m. contrasted to a speed of only 100 f.p.m. when acid pickling was used exclusively for descaling. Even with this increase in production, acid consumption has been cut in half and overall descaling costs materially reduced.

Wheelabrator Engineering Experience At Your Service

Write today for information on how Wheelabrator descaling can cut your costs and speed production. Wheelabrator Corporation, 510 S. Byrkit St., Mishawaka, Indiana. In Canada, P.O. Box 490, Scarborough, Ontario.



WHEELABRATOR
AIRLESS BLAST EQUIPMENT

low decibel rating. Various mounting features are also available. This series comes in different models with 400 cycle ac, 3 phase, 400-cycle ac, single phase, and 28-v dc motors. (The Benson Mfg. Co.)

For more data circle No. 40 on postcard, p. 113

Milling Cutters

Face and shell end milling cutters extend carbide insert life. They also remove more metal per cutting edge, and produce exceptionally fine finishes. The cutter's teeth insure fast, low-cost milling operations with inexpensive, indexable, throw-away carbide inserts. (Adamas Carbide Corp.)

For more data circle No. 41 on postcard, p. 113

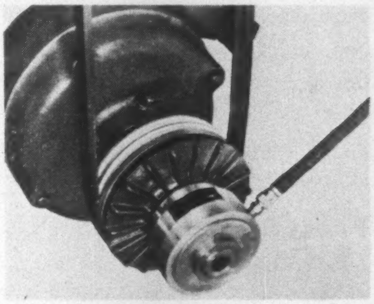
Greaseless Lubricant

Dry and greaseless, a lubricant can be sprayed onto sliding surfaces or moving parts. The white sanitary powder is manufactured from pure Teflon. The lubricant is completely odorless, colorless, tasteless and non-staining. It has the lowest coefficient of friction of any solid material — only 0.016 to 0.024 against polished steel surface. Operating temperature range is from —450° to +400° F. (Polydoris Products Corp.)

For more data circle No. 42 on postcard, p. 113

Air Clutch

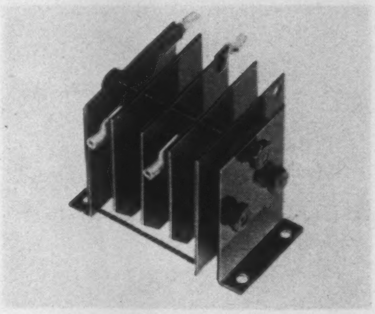
Weighing only 15 lb, an air-operated clutch provides shockless starts without overheating. The unit is self-adjusting; has anti-friction bearings and requires no rotary joint. The unit is also a combination motor sheave and clutch. The clutch is designed for use with motors up to 5 hp at 1800 rpm. (Horton Mfg. Co., Inc.)



For more data circle No. 43 on postcard, p. 113

Silicon Rectifiers

A series of double-diffused, silicon power rectifiers will deliver up to 6 amp in half wave; 30 amp in full wave circuits. These amplifiers are suitable for magnetic amplifier and power supply applications. They can be used at ambient temperatures to 250°C with no detectable change in characteristics due to aging. (Trans-Sil Corp.)

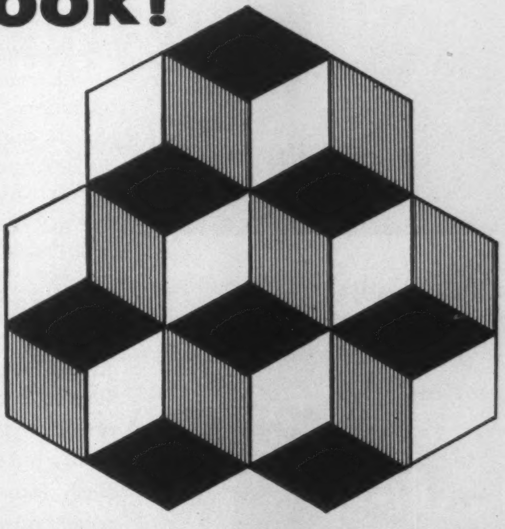


For more data circle No. 44 on postcard, p. 113

EXECUTIVE REPORT #17

TAKE A SECOND LOOK!

Are you getting FULL Value for your Abrasive Dollar?

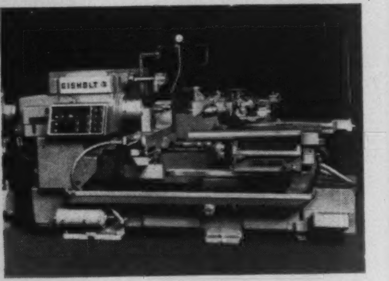


Count the cubes in the figure. You'll see six or seven, depending upon your point of view. Consider the total value of your present abrasive, and compare it with the proven value of Wheelabrator Steel Shot. Not just in price, but in abrasive consumption, cleaning speed, cleaning quality, and equipment maintenance costs as well. From any point of view, the proven quality of Wheelabrator Steel Shot adds up to extra value and extra profit.

Write today for this new handbook of blast cleaning abrasive performance. It's full of charts and facts you can use to help cut abrasive consumption, reduce cleaning costs. Write to Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
STEEL ABRASIVES

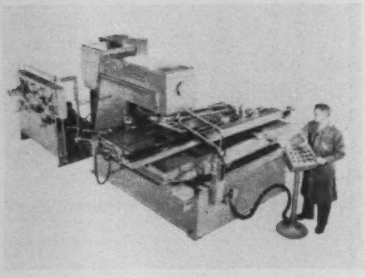
New Equipment and Machinery



Turret Lathe Converts From Bar to Chucking Work

Holding close tolerances, ram-type turret lathe features automatic cycle efficiency; plus the versatility and quick setup of the hand-operated ram type turret lathe on both bar and chucking work. Tool life is longer. Only one hour or less is needed to convert from bar to chucking work. Aside from cycle programming, there are no new procedures to learn—no gears to change. A scale, Allen wrench and screwdriver pre-select all machine functions. (Gisholt Machine Co.)

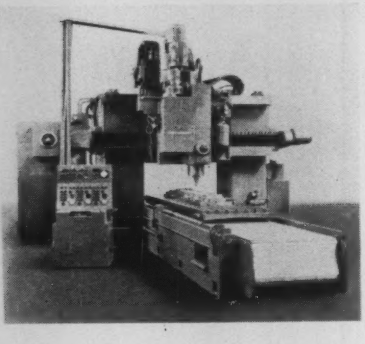
For more data circle No. 46 on postcard, p. 113



Press Requires Only One Punch and Die of a Size

A 15-ton capacity, turret punch press automatically locates and pierces openings. The rate is 60 or more holes per minute, in metal to 30 x 48 x 3/16 in. High-speed operation and its ability to complete jobs in a single handling without setup, make the press particularly applicable for smaller plants specializing in short-run fabrication of sheet-metal or plate. All press operations are regulated by a numerical-control system. (Wiedmann Machine Co.)

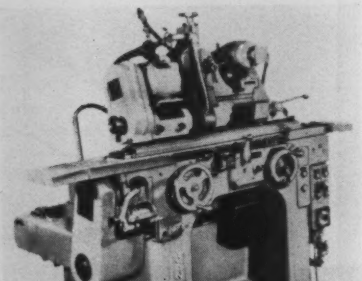
For more data circle No. 47 on postcard, p. 113



Machine Mills Medium to Large Sized Parts

Numerically controlled, a profile and contour milling machine can produce parts of complex shapes. The machine is especially suited to a wide variety of die-sinking type operations. Its 20-hp spindle drive, and 24 spindle speeds ranging from 30-300 rpm, are ideal for the milling of steel, aluminum, titanium and the new exotic metals to come. The machine has a bridge-type structure, with the vertical spindle mounted in a cross-feeding carrier on the horizontal cross rail. A three-axis contouring system controls the machine. It provides complete control of accuracy, quality and production. (The Cincinnati Milling Machine Co.)

For more data circle No. 48 on postcard, p. 113



Grinder Gives Precision and Maximum Economy

Fast and accurate, a cylindrical grinder is compact in size and heavy duty in performance. Optional accessories provide all-around versatility. The accessories permit crush forming and live- or dead-center operation. In addition, an optional sure-set taper indicating gage allows exact swivel table adjustment to eliminate taper or produce a specific taper. All workheads feature a silent chain drive from jackshaft to spindle sleeve. The unit's engineering features include: anti-friction bearing, unitized wheel spindle; coolant system that is individually motorized; large bearing surfaces on all ways; large calibrated feed handwheels and adjustments. Another feature of the machine is operator convenience. (Van Norman Machine Co.)

For more data circle No. 49 on postcard, p. 113

VULCANITE CENTERLESS WORK AND REGULATING WHEELS

PRECISION MATES!

Centerless grinding is the highest in the art of metal finishing. Unless the work wheel and the regulating wheel have been made for each other, a *needless* handicap occurs. U. S. Rubber centerless wheels are precision-mated. The production of perfect mates for centerless grinding is a U.S. Rubber specialty.

"U.S." Vulcanite was the first rubber-bonded wheel made for industrial America. 100 years of production and research back up our present *precision mates*. The hundreds of plants that use "U.S." Vulcanite *precision-mated* wheels prove the point that to do otherwise imposes a needless handicap.

The "U.S." Grinding Wheel sales engineer will save dollars for you in your grinding operations. We will welcome a call from you at U.S. Rubber, Grinding Wheel Dept., 10 Eagle Street, Providence, R. I., or the address below.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Hand coiling of small spring orders is a skilled operation at The Yost Superior Co. in Springfield, Ohio. The company uses Johnson Music Spring Wire exclusively. Here, worker coils .012 wire into a compression spring with 16 coils having an O.D. of .196 inch. Small orders are filled overnight in this department.

Johnson Wire Speeds Overnight Delivery Of Handmade Springs

A spring maker who built a flourishing business by filling small orders practically overnight uses Johnson Steel & Wire Company's Music Spring Wire exclusively.

President L. V. Barnes of The Yost Superior Company, Springfield, Ohio, says flatly:

"Johnson Music Spring Wire is best." Since 1924, when a merger of Superior Spring Co. and Yost Gearless Motor Co. formed The Yost Superior Co., the firm has concentrated on producing custom-made springs and wire forms.

In one day recently, five telephoned orders for small lots of springs all specified the quickest possible delivery. "Three of those orders went out the same day and the other two were shipped the next morning," said William H. Craig, secretary-treasurer who heads production and purchasing activities.

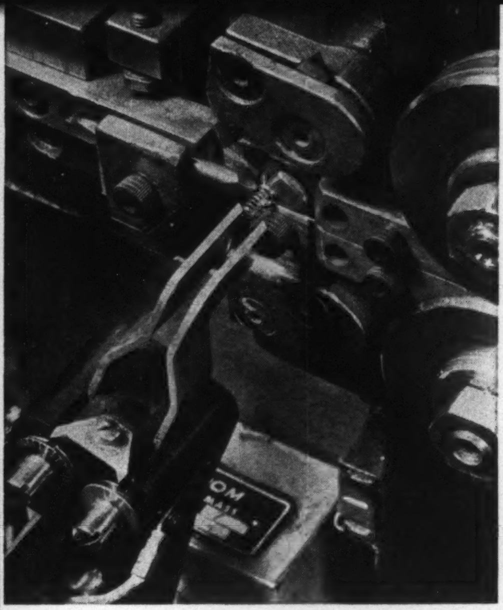
Three factors are all-important to Yost Superior. They are:

- **Spring Making Skill** — Yost Superior's bonus incentive plan, the long tenure of its employes and its steady growth for more than a half-century all demonstrate the company has a skilled work force which knows and practices the art of spring making.

- **Sizable Inventory**—Large wire stocks, usually running around 500 tons, are always on hand in Yost Superior's stock room. Mr. Craig said: "Our customers depend on us to supply their needs quickly. That means large stocks of wire sizes commonly used." He added:

"Johnson Music Spring Wire is so good—consistently—that we feel confident in laying in a large supply. We don't worry about quality varying from coil to coil or shipment to shipment. We can depend on wire we buy today to match the properties and performance of wire we bought a year ago.

"When we order from Johnson,



Electronic gager on this Torrington W10A Coiler measures to .005 inch in determining whether each spring coiled is the proper length. Springs rejected by the gager are blown to the side while good springs fall into container. Spring being coiled is made of .010 inch Johnson Music Spring Wire. It has an O.D. of .121 to .126 inch and is 5/16 inch long. It takes 1,000 springs to weigh a quarter pound.

Coiling a long spring on a Torrington W12A coiler from Johnson .120-inch diameter Music Spring Wire. The 95 coils in this spring measure 30-1/2 inches in length. Each coil has an O.D. of 1-1/16 inches.

we get quick delivery from warehouses in Akron or Chicago."

• Good Raw Materials — President Barnes said: "We demand the utmost in uniformity of diameters, finishes, tempers and physical properties. We get it from Johnson Steel & Wire Co.

"We don't have to ask for service. It's given us without asking. And Johnson Music Spring Wire has worked well for us. I would say their wire is the best. One hundred percent testing of finished springs proves it.

"We're accustomed to holding the diameter of springs — and often spring lengths — to tolerances stated in thousandth's, so we've got to have good wire. Johnson Music Spring Wire helps us meet specs and its performance helps us meet load requirements."

While Yost Superior makes springs in large production runs for everything from grass seed spreaders to missiles and rockets, its Hand Department is a key operation.

In the Hand Department where orders for less than 100 springs or wire forms are filled, Johnson Music Spring Wire proves itself.

Coiling springs by hand means high labor costs so it's important to keep them down to a minimum or the cost of making a few springs would go sky high. Here cost of the wire is insignificant but quality of the wire is most important.

• Quality Comes Through — That's because there's little or no time for experimenting or trial runs. The Hand Department pays off because the spring maker knows his business and uses Johnson Steel Wire with its predictable performance qualities.

Yost Superior uses the full range of Johnson Music Spring Wire from .008 inch diameter up to .250 inch to make all kinds of compression, extension and torsion springs as well as a bewildering array of wire forms.

That's a good recommendation for any spring maker. Whatever your needs for Music Spring Wire or any other fine wire specialty, you can count on Johnson Steel & Wire Co. to give you the same consistent quality and good service which pleases Yost Superior.

You can get better wire and better products, starting today. Just call the nearest district sales office, listed here, and talk to a Johnson man who knows wire and production problems.

Grinding of spring ends on a Besly Grinder. These compression springs, made of .047 inch O.D. Johnson Music Spring Wire, are only 9/16 inch long and have an O.D. of 13/32 inch. On this machine, the closed ends are being ground square.

Coils of Johnson Music Spring Wire are delivered to the Coiling Department from Yost Superior's large stock room. The company normally carries an inventory of about 500 tons of wire.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

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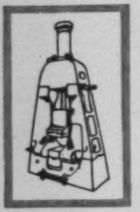
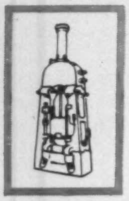
FOR FORMING MATERIALS BY IMPACT



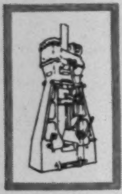
CECO-DROP

The most effective and economical gravity drop hammer. Air or steam operated. No boards to change, no back rods to lift. Safer, easier operation. Equipped with non-slip piston rod clamp, ram die-setting control and nylon-cushioned stroke control. New "Blowmatic" program controller for semi-automatic forging available. Sizes 500 lbs. to 10,000 lbs. Ask for Bulletin No. 80-L-7.



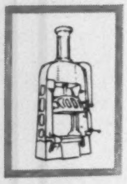
FORMING DROP

An air-operated, piston-lift, gravity-drop hammer designed especially for operations common to coining presses, compacting presses, strap hammers, pneumatic drop hammers, etc. May be operated manually, semi-automatic or completely automatic. Electric control system. Sizes 500 lbs. to 5000 lbs. Ask for Bulletin No. 73-L-7.



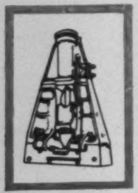
BOARD DROP HAMMER

The best of the board drop hammers. Belt or motor drive. Unique board clamp arrangement and improved roll design promcte better board life, result in less down time. Unusual strength and rigidity. Sizes 100 lbs. to 5000 lbs. Ask for Bulletin No. 90-L-9.



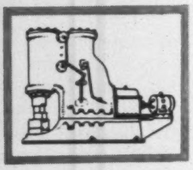
CECOSTAMP

An air-operated impact drop stamp that produces a controlled blow or a "squeeze" instantly, at the will of the operator. Gives a permanent set to all the formable metals—even high strength alloys. Popular in iron foundries as inexpensive, highly productive tool for restriking malleable castings. Sizes from 21" x 18" platen area to 120" x 120" platen area. Ask for Bulletin No. 30-L-5.



STEAM DROP HAMMER

Designed to produce forgings at lowest cost per piece. Unique differential porting on Model "E" makes for the most efficient use of steam or air—greatest economy of power. Unusual strength and rigidity reduces down time, maintains alignment, increases production. Sizes 1000 lbs. to 16,000 lbs. Ask for Bulletin No. 55-L-4.

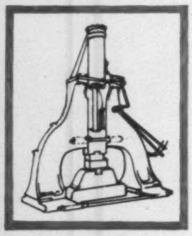


PNEUMATIC HAMMER

Popular motor-driven hammer with self-contained compressor, for flat-die or blacksmithing operations. Ideal for tool dressing, for research laboratory work, etc. An exceptional forging tool, independent of steam or air lines. Sizes 200 lbs. to 5000 lbs. Ask for Bulletin No. 16-L-9.

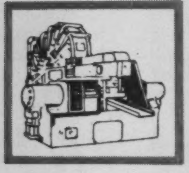
SINGLE FRAME HAMMER

High frame provides greater working space. Specially designed forged alloy steel dies ease stock manipulation. Power-saving cylinder cuts operating costs. Preferred for forging large discs and rings, upsetting high stems, etc. Ram guides supported on 5 sides. Sizes 750 lbs. to 6000 lbs. "Power/trol" power-assist controls on 2500 lb. hammers and larger. Ask for Bulletin No. 1-L-4.



DOUBLE FRAME HAMMER

Large working space for special or routine jobs. Well suited for making large rings, cogging and drawing out toughest alloy steels and high temperature "exotic" metals, making large axle forgings, etc. Heavy 15:1 anvil increases blow effectiveness. Sizes 2000 lbs. to 24,000 lbs. "Power/trol" power-assist controls on 3000 lb. hammers and larger. Ask for Bulletin No. 74-L-7.



THE IMPACTER & CECOMATIC FORGING

The revolutionary Chambersburg Impacter forges by means of horizontally-opposed rams striking the stock simultaneously from both sides. This new concept of the forging process makes possible the continuous, automatic production of drop forgings. Fully described in Bulletin No. 87-L-9.

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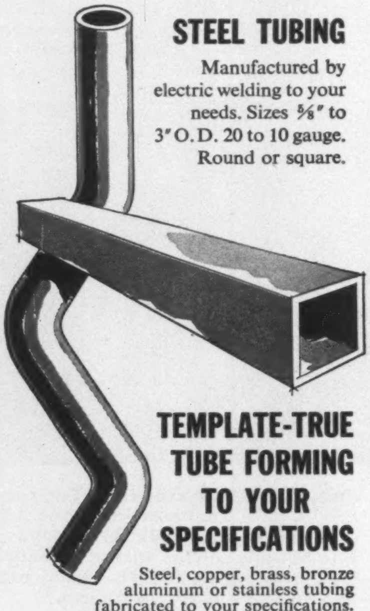

STEEL TUBING

Manufactured by electric welding to your needs. Sizes ⅝" to 3" O.D. 20 to 10 gauge. Round or square.

TEMPLATE-TRUE TUBE FORMING TO YOUR SPECIFICATIONS

Steel, copper, brass, bronze aluminum or stainless tubing fabricated to your specifications. Sizes ⅜" to 6" OD, 20 to 10 gauge.

Thirty-four years of experience in forming, welding, beading, bending, stamping of formed tubes.

Top-flight engineering service.

Write, wire or phone for booklet or quotation.

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Formed Tubes, INC.

The Iron Age Summary

Order Pickup Is Only Seasonal

The rate of incoming steel orders is not enough to sustain a major improvement this fall.

Steelmaking operations now depend on overall business and the outlook is more and more pessimistic.

- Improvement in steel orders is seasonal at best. This slow rate of new steel business means that there may be no major upturn in steel operations for the rest of the year.

The improvement, coming in small percentage gains at intervals, is not enough to bring any sizable change in the market. To assure any kind of a rate of improvement, new orders should now be coming in at least at a rate that would support an ingot rate of 70 pct by the middle of October.

Only 50 pct — Instead, order volume in the past few weeks would sustain only about 50 to 55 pct operations.

The reason for the poor rate of new business is not hard to see: The big steel users, other than automotive, are not likely to pick up their rate of steel ordering from present low levels.

Overall consumption continues to lag, and the spreading of a recession feeling will only bring consumers into an even more cautious frame of mind.

Automakers Hold Up — Most hopes of a significant upturn now hinge on automakers. But automotive tonnage has held up comparatively well this year. Now, automakers are cautious, but not overly so. Neither are they going out on a limb.

Here is the direct report from Detroit:

October steel orders from automakers are now pretty well set. Some miscellaneous orders are still straggling in. October will wind up better than September.

Inconclusive—It's too early to predict what will happen in November and December. Although some orders are coming in for November, they are inconclusive. And inventory of automotive steel is still fairly high.

Orders from the Big Three for November look all right, but are not fabulous by any means. Here and there, some holdups and cancellations are occurring and steel men are only hoping they don't spread.

About the only hopeful aspect is that most other users are low in inventory. This has resulted in an upturn in the number of orders coming into steel sales offices. But many of these are for small tonnages on a rush basis.

Depends on Business — In any case, a significant move in steel now rests on overall economic movement. And the gloomy outlook for much of metalworking has most in the industry in a pessimistic mood.

The disappointing outlook for capital goods buying (See p. 69) adds to the overall pessimism in the industry. While the overall economy is holding up well in terms of most indicators, much of the metalworking industry is in a recession period.

As it stands now, it could be well into 1961 before there is a significant upturn in overall business to give a real boost to steel.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,537	1,510	1,547	362
Ingot Index				
(1947-1949=100)	95.7	94.0	96.3	22.5
Operating Rates				
North East Coast	60.0	58.0*	60.0	12.0†
Buffalo	58.0	59.0	58.0	0.0†
Pittsburgh	42.0	42.0*	45.0	28.0†
Youngstown	45.0	43.0*	45.0	10.0†
Cleveland	55.0	48.0*	50.0	0.0†
Detroit	73.0	71.0*	75.0	25.0†
Chicago	62.0	62.0*	58.0	5.0†
Cincinnati	56.0	57.0*	60.0	65.0†
St. Louis	72.0	75.0*	70.0	97.0†
South	51.0	45.0*	60.0	12.0†
West	54.0	53.0*	53.0	0.0†
U. S. Rate	53.9	53.0	54.3	12.8

*Revised †IRON AGE Estimates

Source: American Iron and Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.41	$66.41	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$31.83	$31.83	$32.50	$42.50
No. 2 bundles	$22.17	$23.17	$22.17	$28.50
Nonferrous				
Aluminum ingot	26.00	26.00	26.00	26.80
Copper, electrolytic	33.00	33.00	33.00	30-31.50
Lead, St. Louis	11.80	11.80	11.80	12.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	102.00	102.375	101.625	102.625
Zinc, E. St. Louis	13.00	13.00	13.00	12.00

Plating Supplies Market Varies

Plating chemicals and metals are selling a little better than they did in 1959.

However, there has been a slight drop in sales of plating equipment.

- Sellers of plating chemicals and metals say business is just a little bit better this year than in 1959.

But many makers of plating equipment report a drop in orders from last year.

Why? "There are fewer square yards of plating being done by our best customers this year—automotive, marine, appliance industries. But they are putting on much heavier coatings," says a spokesman for one plating supply company.

Market Easy—Most plating suppliers, including those doing better business than last year, say the market is easy. There are no shortages, or impending shortages, of metals, chemicals, or equipmnt. Immediate delivery is standard on almost all items.

Price patterns are unusually stable. Chemicals haven't moved much in the last few years. And they aren't likely to in the near future, say most suppliers.

Metals for plating traditionally follow the trends of primary metal markets. This will continue.

Improvements Coming — The trend in plating supplies today, say major sellers, is to improve the standard items in form, shelf-life, handleability, speed of operations.

For instance, Metal & Thermit Corp., in the last year has introduced chromic acid in pellets. Formerly it was available only in flake form. M & T points out that flakes tend to either cake or be ground to dust in shipping and handling. This makes it difficult to pour, and difficult to measure when only a percentage of a drum is needed. Further, chromic acid is highly corrosive which increases handling problems. Pellets of identical composition solve these problems, say M & T. And, as an added bonus, M & T colors the chromic acid pellet drums for easier inventory control.

Many Facets—Udylite Corp., another major plating supplier says, "Developments in plating equipment have paralleled the progress toward economical, long-lasting finishes.

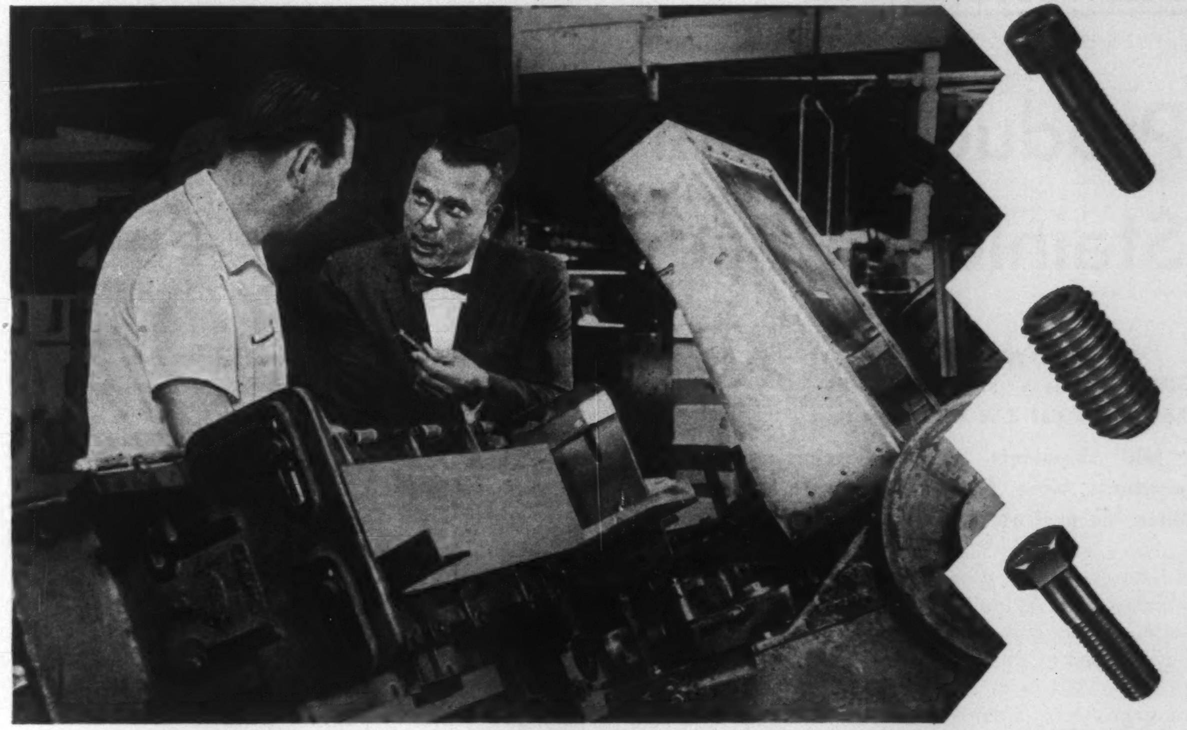
"Udylite researchers have developed special machines to handle a variety of requirements of new and old customers. Such equipment includes the versatile fully automatic, return-type, barrel plating machine, and a variety of automatic and semi-automatic machines for every conceivable plating situation."

Protective Law—Udylite has also developed Zero-Mist tablet, which it says eliminates the mist and spray that usually rises from chrome plating tanks. Udylite says that in England and the Netherlands public health laws now require electroplaters to either ventilate chromium plating tanks or use Zero-Mist.

Most of the improvements being made, say plating suppliers, will not boost the bills of platers. Many are technological advances by the plating suppliers which don't cost much more to produce. And competitive factors keep increases on streamlined machinery to the minimum.

IMPORTANT TREND: Makers of plating equipment say today's trend in the industry is to improve standard items in form, shelf life, handleability and speed of operations. For example, Udylite Corp. has developed a number of new machines to fill recent needs of new and old customers.

IT PAYS TO STANDARDIZE ON **STANSCREW**



Stanscrew solves production problem, saves money for Ball closures

The specialized machines which every day turn out millions of jar tops, bottle caps, and other closures for Ball Brothers Company, Inc. must work to a very tight production schedule. Fastener failures in this equipment can be extremely costly.

One particular application was a real headache. Even specially designed fasteners failed time and time again. Ball's distributor then called in the Stanscrew fastener specialist. His recommendations included minor redesign, the use of a particular standard fastener from Stanscrew's complete selection, and detailed instructions on its application. This eliminated many production interruptions for Ball . . . for important savings.

Whether you need fasteners for the maintenance of important production machinery or as components of your finished product, you can often save money by standardizing on Stanscrew . . . as more and more industrial leaders are learning. Stanscrew offers a complete stock of 5,500 different standard fasteners . . . produced to the highest quality standards made possible by American technology . . . to provide economical answers for the overwhelming majority of all industrial fastener requirements.

The suggestions and technical assistance of the Stanscrew fastener specialist may result in significant savings in your assembly and maintenance costs. Your local Stanscrew distributor will be happy to arrange a prompt visit. Call him today.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

Producers Trim Stainless Prices

Prices for Type 304 and Type 304L stainless steel products have been cut 2.5c to 3c per lb.

Mill shipments of stainless products have fallen steadily since the first of the year.

■ The competitive situation in stainless steel is pointed up by a series of price cuts. Most producers have moved to equalize base prices of Type 304 with Type 302 for most products. Comparable reductions were made for Type 304L. Reductions average between 2.5¢ and 3¢ per lb.

According to one company, Types 304 and 302 are closely related. And price changes were made to simplify stocking by customers. Others admit they cut prices for competitive reasons.

Typical Changes—Except for a few specialty items, prices for stainless steel products have remained virtually unchanged since the end of 1958. And in the latest move, prices for rerolling ingots, slabs, and plates remain unchanged.

Typical changes in Type 304 stainless include a 2.5¢ per lb cut in prices of forging billets to 39.5¢ from 42¢; structural bars have been trimmed 2.75¢ to 46.75¢. Similar reductions apply to hot- and cold-rolled strip, sheets, cold-finished wire, and hot-rolled rod products. (For new prices, see p. 145.)

Improvement Noted—Mill shipments of stainless products have fallen steadily since the first of the year. In January, the industry shipped 71,100 tons; in July it shipped 34,800 tons, according to the most recent figures available from the American Iron and Steel Institute.

However, July is believed to be the low point for the industry. There has been an increase in stainless business in recent weeks.

Sheet and Strip—Automotive remains the only significant prop to the market. But even this support is disappointing. A major sheet mill in **Pittsburgh** reports there has been no real change in the order rate. Automotive lags behind expectations because of third quarter inventory buildups and current production delays. A similar situation exists in appliance and other fields. Reports from **Detroit** indicate that major automotive orders for October are set with just miscellaneous orders straggling in. Steel sales officies there rate August as a good month, September as poor, and October is expected to show an improvement — but probably only about as good as August. The one optimistic report comes from **Cleveland.** But even there the outlook hinges on how well the new autos are received by the public.

PURCHASING AGENT'S CHECKLIST.

More companies buy industrial radio systems for plant and office use. P. 59

Metalworkers cut back capital goods spending—IRON AGE report on second quarter appropriations. P. 69

New assembly line forms structural assemblies at joist-per-minute rate. P. 97

Tinplate—September is the last month of the season for peak consumption. But shipments haven't shown any signs of improving. Producers are resigned to the fact that the year will fall short of earlier predictions. At least one **Pittsburgh** mill has cut production as inventories begin to pile up. There's still no indication of any price movement on Dec. 1, and the deadline for the 35-day price notice is not far off.

Plates and Structurals—There is no noticeable improvement in the market. Order volume remains slightly below the average for all products. **Pittsburgh** producers say the depressed level can no longer be attributed to inventory adjustments alone. But construction jobs coming up point to increased demand, although the upturn may not come before next year. Customers served by the **Cleveland** district are increasing the number of small-lot spot-tonnage plate orders.

Pipe and Tubing — The long awaited breakthrough for linepipe projects has yet to materialize, according to **Pittsburgh** reports. On standard pipe, jobbers are ordering from day to day. With delivery available from stock, there is little or no forward buying.

Warehouses — Shipments from steel service centers in August showed a mild increase of 3 to 5 pct over July, according to the Steel Service Center Institute in **Cleveland.** It's the first increase noted in recent months. For the first eight months of this year, shipments were 25 pct below strike-swollen 1959 and only slightly better than the 1958 rate. However, the August increase has done little to buoy warehousemen. If anything, says a **Pittsburgh** warehouseman, business is getting worse. And disappointment is evident in Chicago where service centers say September is only about 5 pct ahead of last month when it should be at least double that figure. Many **Midwest** warehouses are still trimming inventories—and some have indicated the reductions will be permanent.

COMPARISON OF PRICES

(Effective Sept. 20, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Sept. 20 1960	Sept. 13 1960	Aug. 23 1960	Sept. 22 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Sept. 20 1960	Sept. 13 1960	Aug. 23 1960	Sept. 22 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila	$70.57	$70.57	$70.57	$70.57
Foundry, South Cin'ti	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$31.50	$31.50	$31.50	$45.50
No. 1 steel, Phila. area	34.50	34.50	34.50	41.50
No. 1 steel, Chicago	29.50	29.50	31.50	40.50
No. 1 bundles, Detroit	28.50	28.50	29.50	39.50
Low phos., Youngstown	34.50*	35.50	37.50	45.50
No. 1 mach'y cast, Pittsburgh	47.50	47.50	47.50	53.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	52.50
No. 1 mach'y cast, Chicago	45.50	45.50	47.00	62.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$31.83	$31.83	$32.50	$42.50
No. 2 bundles	22.17*	23.17	22.17	28.50
Coke, Connelsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	30-31.50
Copper, Lake, Conn.	33.00	33.00	33.00	31.50
Tin, Straits, N. Y.	102.00	102.375	101.625	102.625
Zinc, East St. Louis	13.00	13.00	13.00	12.00
Lead, St. Louis	11.80	11.80	11.80	12.80
Aluminum, ingot	26.00	26.00	26.00	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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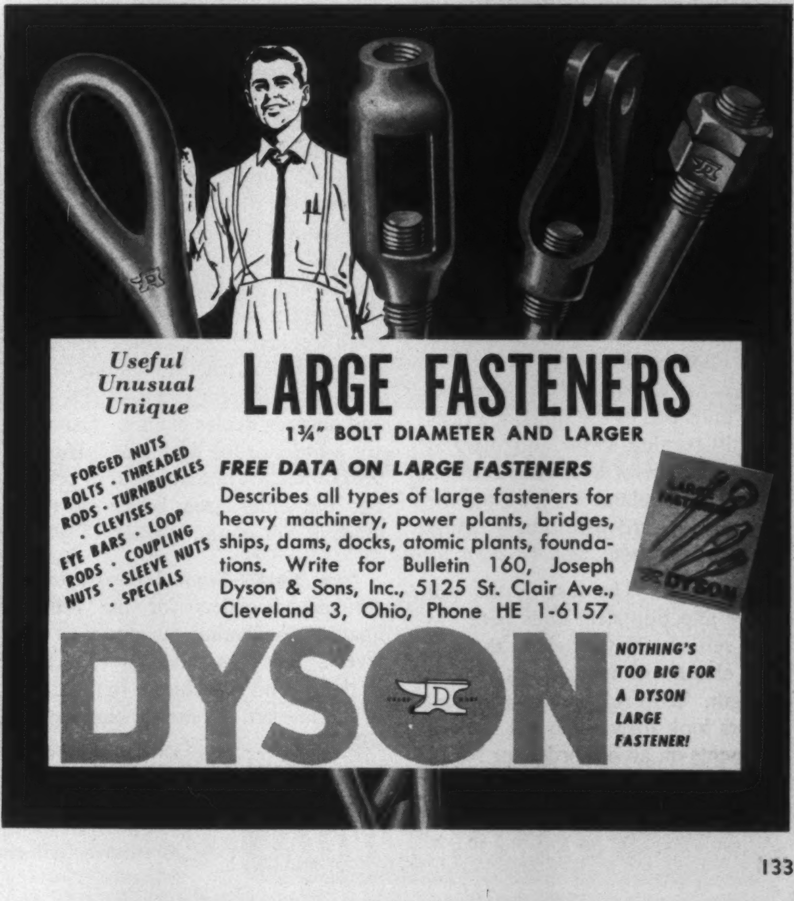

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DYSON

NOTHING'S TOO BIG FOR A DYSON LARGE FASTENER!

Trade Writes Off Rest of 1960

There isn't a trace of optimism left among scrap dealers for the rest of this year.

Even in the doldrums of 1958, and strike of 1959, prices were much higher.

▪ Scrap dealers have been drained of what little optimism remained. Most are now hoping for a pickup in 1961 and writing off this year.

They had high hopes that the end of the summer would mean a firmer tone to the market. One year ago, during the steel strike, the scrap market was riding high with optimism and prices climbing.

No. 1 heavy melting in Pittsburgh was going for $45 to $46 a ton. This week the quoted price for that grade in Pittsburgh is $31 to $32 a ton.

Even during the recession months of 1958, things were better for dealers. On July 31, 1958 the big question was "how much higher will prices go?" In September, 1958 Pittsburgh's No. 1 heavy melting price was firm at $44 to $45 a ton.

This week, many areas report large mills out of the market. Prices are still turning softer and there is not one report of a firming market. In fact, Cleveland reports the closing of a yard with others barely holding their own.

Pittsburgh—The last of the rail strikes affecting steel mills here has been settled. Nevertheless, there is little change in market activity or strength. With rail service restored, dealers look forward to the start of shipments on an old order for No. 2 bundles. However, this is the only encouraging development. There is no sign that big mills are ready for general buying of openhearth grades. Foundry demand for low phos scrap is very weak. Railroad specialties, which showed surprising strength during the summer, are now falling back into line with the rest of the market.

Chicago—Prices continue to drift with uncertainty at last week's levels. Range on prices reported continues to widen as brokers buy against new orders written last week, and older orders which they are closing out at higher prices. The general feeling is that there will be no firm movement until industrial lists are announced next week. However, preliminary bidding for industrial material seems weak.

Philadelphia—A small purchase of No. 2 bundles by an area mill is confirmed at $21. Several other purchases have been made at slightly higher prices, but all well below the quoted price. Domestic activity is still very inactive with only scattered "token" purchases. Exports are continuing firm though one dealer says, "Exports are still lively," and another dealer claims, "Exports are a little on the easy side." Heavy breakable cast remains firm in price, but the chief area buyer of this grade is out of the market.

New York—Some Japanese buyers placed orders for the fourth quarter confirming current price levels. This was generally expected so there is no real change in the tone of the market. Domestic business is still nil.

Detroit — Lack of dealer sales and mounting scrap output by automakers is expected to push prices even lower on the October industrial list. There is no domestic interest at all. The Canadian market is soft and overseas shipments give evidence of slowing down as the end of the Great Lakes season nears.

Cleveland—The market is off about $1 as major mills continue to stay out of the market. Only occasional cars of dealer material are moving and production scrap is going on old orders. One Cleveland yard is reported closing and most others are just barely holding their own.

Cincinnati—With mills practically out of the market, yard activity is as slow as ever. There is some foundry activity, but no great surge. Up-river demand is also very slow.

St. Louis — Prices continue to drift lower in this area. The hopes for an upturn and the signs of firmness that existed a few weeks ago have completely disappeared.

Birmingham — The market was quiet this week after a flurry of buying by electric furnaces and foundries last week. Low supplies in dealers yards are holding prices firm, however.

Buffalo — The market is at a standstill with absolutely no sales this week. All prices remain unchanged and dealers are expecting no new activity in the near future.

Boston — There are no price changes again this week. Dealers report virtually no domestic business and exports are next to nothing.

West Coast—Major mills are still out of the market. And there are no signs that they'll be returning in the near future. Exporting continues to take what scrap is being generated, but prices are soft.

Houston—The market is quiet in all grades. Even export has slowed to the point where one exporter is reluctant to quote buying prices. One district mill has remained out of the market.

MOTOR DRIVE HOUSING

THREE VERTICAL UNITS

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TURN 2.75 DIAM.
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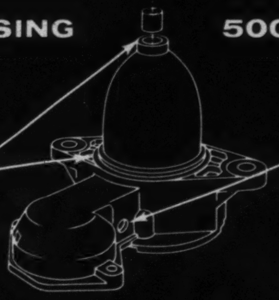
3V FINISH REAM FOR BUSHING

4V PRESS IN BUSHING
BURNISH BUSHING I.D.



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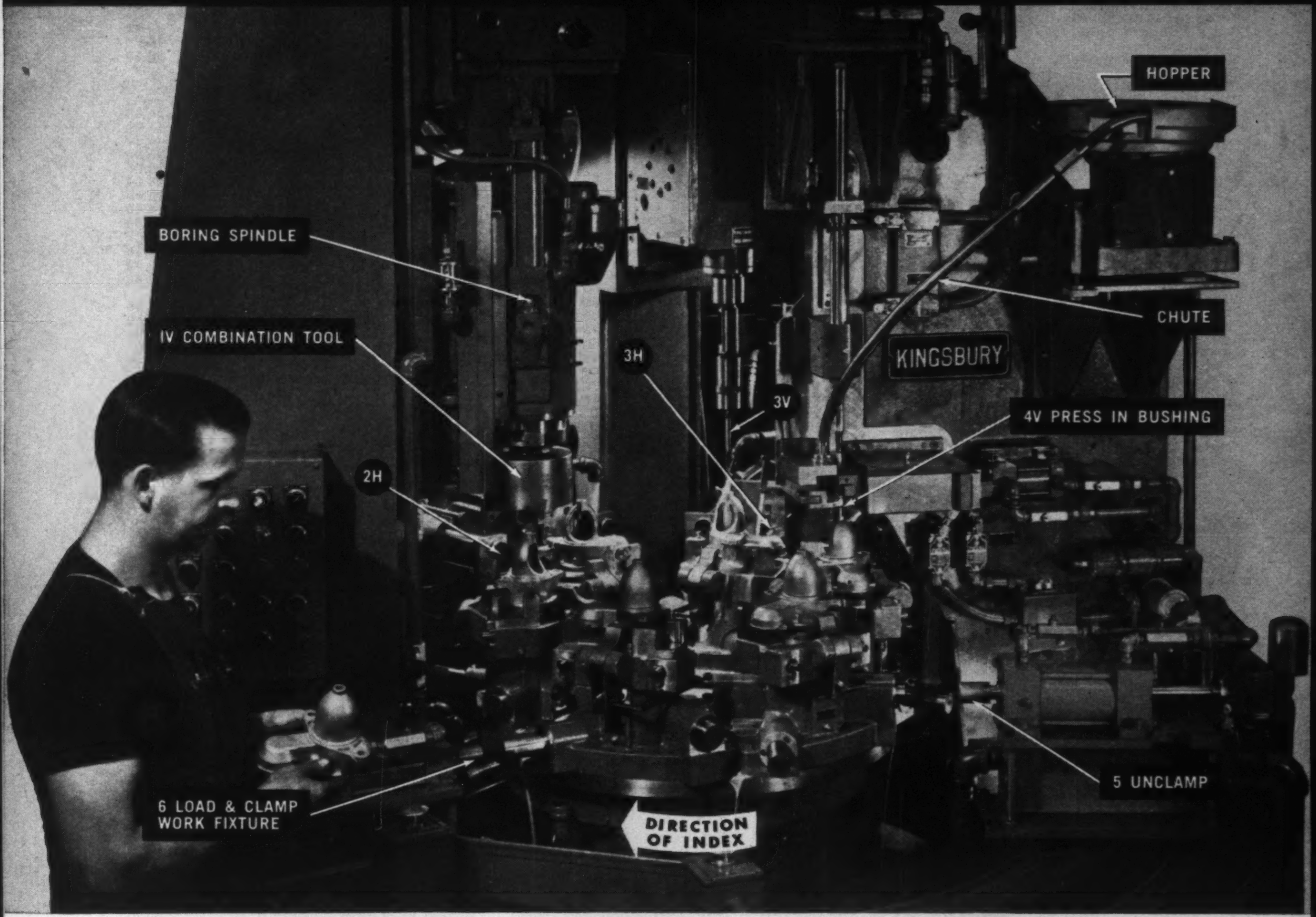

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KINGSBURY MULTI-UNIT AUTOMATICS

SCRAP PRICES

(Effective Sept. 20, 1960)

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	32.00 to 33.00
No. 1 factory bundles	38.00 to 39.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	19.00 to 20.00
Low phos. punch'gs plate	38.00 to 39.00
Heavy turnings	27.00 to 28.00
No. 1 RR hvy. melting	37.00 to 38.00
Scrap rails, random lgth.	46.00 to 47.00
Rails 2 ft and under	50.00 to 51.00
RR specialties	44.00 to 45.00
No. 1 machinery cast.	47.00 to 48.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	36.00 to 37.00
Stainless	
18-8 bundles and solids	185.00 to 190.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	90.00 to 95.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	30.00 to 32.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	15.00 to 16.00
Low phos. forge crops	40.00 to 41.00
Low phos. punch'gs plate, ¼ in. and heavier	36.00 to 37.00
Low phos. 2 ft. and under.	34.00 to 35.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rails, random lgth.	41.00 to 42.00
Rerolling rails	52.00 to 53.00
Rails 2 ft. and under	46.00 to 47.00
Angles and splice bars	42.00 to 43.00
RR steel car axles	50.00 to 51.00
RR couplers and knuckles.	39.00 to 40.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	40.00 to 41.00
Cast iron wheels	31.00 to 32.00
Malleable	44.00 to 45.00
Stove plate	34.00 to 35.00
Steel car wheels	38.00 to 39.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	85.00 to 90.00
430 bundles and solids	85.00 to 90.00
430 turnings	40.00 to 50.00

Philadelphia Area

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	14.00 to 15.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	20.00 to 21.00
Clean cast. chem. borings.	23.00 to 24.00
Low phos. 5 ft and under	37.00 to 38.00
Low phos. 2 ft punch'gs	39.00 to 40.00
Elec. furnace bundles	36.00 to 37.00
Heavy turnings	27.00 to 28.00
RR specialties	39.00 to 40.00
Rails, 18 in. and under	51.00 to 52.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	39.00 to 40.00
Cast iron car wheels	40.00 to 41.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.50 to $27.50
No. 2 hvy. melting	22.50 to 23.50
No. 1 dealer bundles	26.50 to 27.50
No. 2 bundles	17.50 to 18.50
Machine shop turn.	10.00 to 11.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Low phos. 18 in. and under	35.00 to 36.00
Rails, random length	42.00 to 43.00
Rails, 18 in. and under	50.00 to 51.00
No. 1 cupola cast.	37.00 to 38.00
Hvy. breakable cast.	31.00 to 32.00
Drop broken cast.	49.00 to 50.00

Youngstown

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	19.00 to 20.00
Low phos. plate	34.00 to 35.00

Cleveland

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	21.50 to 22.50
No. 1 dealer bundles	30.00 to 31.00
No. 1 factory bundles	33.00 to 34.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut structural & plates, 2 ft. & under	36.00 to 37.00
Low phos. punch'gs plate.	31.00 to 32.00
Drop forge flashings	30.00 to 31.00
Foundry steel, 2 ft. & under	34.00 to 35.00
No. 1 RR hvy. melting	34.50 to 35.50
Rails 2 ft. and under	49.00 to 50.00
Rails 18 in. and under	50.00 to 51.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	47.00 to 48.00
No. 1 machinery cast.	50.00 to 51.00
Stove plate	39.00 to 40.00
Malleable	45.00 to 46.00
Stainless	
18-8 bundles	180.00 to 185.00
18-8 turnings	75.00 to 80.00
430 bundles	80.00 to 85.00

Buffalo

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 busheling	29.00 to 30.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	21.00 to 22.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	14.00 to 15.00
Low phos. plate	36.00 to 37.00
Structurals and plate, 2 ft. and under	38.00 to 39.00
Scrap rails, random lgth.	37.00 to 38.00
Rails 2 ft. and under	47.00 to 48.00
No. 1 machinery cast.	46.00 to 47.00
No. 1 cupola cast.	40.00 to 41.00

St. Louis

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	27.00 to 28.00
Foundry steel, 2 ft.	29.00 to 30.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	20.00 to 21.00
No. 1 RR hvy. melting	31.00 to 32.00
Rails, random lengths	37.00 to 38.00
Rails, 18 in. and under	39.00 to 40.00
RR specialties	38.00 to 39.00
Cupola cast.	42.00 to 43.00
Heavy breakable cast.	34.00 to 35.00
Stove plate	36.00 to 37.00
Cast iron car wheels	35.00 to 35.00
Rerolling rails	51.00 to 52.00
Unstripped motor blocks	35.00 to 36.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	17.00 to 18.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	10.00 to 11.00
Electric furnace bundles	32.00 to 33.00
Elec. furnace, 3 ft. & under	35.00 to 36.00
Bar crops and plate	39.00 to 40.00
Structural and plate, 2 ft.	38.00 to 39.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rail, random lgth.	39.00 to 40.00
Rails, 18 in. and under	45.00 to 46.00
Angles and splice bars	38.00 to 39.00
No. 1 cupola cast.	47.00 to 48.00
Stove plate	47.00 to 48.00
Cast iron car wheels	38.00 to 39.00
Unstripped motor blocks	34.00 to 35.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	21.00 to 22.00
No. 2 dealer bundles	16.00 to 17.00
Machine shop turnings	7.00 to 8.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	10.00 to 11.00
Clean cast. chem. borings	18.00 to 19.00
No. 1 machinery cast.	37.00 to 38.00
Mixed yard cast.	33.00 to 34.00
Heavy breakable cast.	31.00 to 32.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	18.00 to 19.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	17.00 to 18.00
No. 1 busheling	25.00 to 26.00
Drop forge flashings	25.00 to 26.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Heavy breakable cast.	30.00 to 31.00
Mixed cupola cast.	34.00 to 35.00
Automotive cast.	42.00 to 43.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	60.00 to 65.00
430 bundles and solids	60.00 to 65.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 dealer bundles	25.00 to 26.00
No. 2 bundles	14.00 to 15.00
No. 1 busheling	25.00 to 26.00
Machine shop turn.	5.00 to 6.00
Shoveling turnings	8.00 to 9.00
Clean cast. chem. borings.	12.00 to 13.00
No. 1 machinery cast.	38.00 to 39.00
Mixed cupola cast.	32.00 to 33.00
Heavy breakable cast.	27.50 to 28.50

San Francisco

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	30.00
No. 2 bundles	20.00
Machine shop turn.	$14.00 to 15.00
Cast iron borings	14.00 to 15.00
No. 1 cupola cast.	46.00

Los Angeles

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	27.00
No. 2 bundles	17.00
Machine shop turn.	13.00
Shoveling turnings	15.00
Cast iron borings	$15.00 to 16.00
Elec. furnace 1 ft. and under (foundry)	42.00 to 43.00
No. 1 cupola cast.	44.00

Seattle

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	33.00
No. 2 bundles	22.00
No. 1 cupola cast.	36.00
Mixed yard cast.	36.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$25.80
No. 2 hvy. melting cut 3 ft. and under	22.50
No. 1 dealer bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Bush., new fact., prep'd	25.50
Bush., new fact., unprep'd	20.45
Machine shop turn.	10.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	33.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	31.00
No. 2 bundles	18.00
Machine shop turn.	12.00
Shoveling turnings	14.00
Cut structural plate 2 ft. & under	$40.00 to 41.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast.	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00

what's the score?

When the Olympic games started around the year 776 B.C. spectators sat on nearby hills to watch the runners, discus throwers and other athletes. Greek soldiers pitched quoits as Xerxes approached Thermopylae. Roman chariot races in the Circus Maximus have been immortalized in literature and drama.

During the Middle Ages, sports included shooting and fencing; and the fifteenth century was famous for its tournaments of knights armed with lances, swords, battle axes, and shields, and outfitted in chain mail, or armor made entirely of plates.

The score of today's contests is broadcast from grandstands of concrete and steel; steel is used for dies to cut baseball gloves, for wire on catchers' masks, heads of golf sticks, reels on fishing rods, hulls for watercraft, pin setters in bowling alleys.

For hundreds of sports activities, steel is a necessity for equipment, for spectator comfort and convenience. To maintain ample supplies to meet these and the numerous other civilian and military demands, a flow of scrap to the mills must be continuously maintained.

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1960—OUR 50th YEAR

Aluminum Market Hits "Flat Plateau"

Aluminum sales have leveled off and no real pickup can be expected until 1961.

Sales this year may be below 1959, but new markets are encouraging producers.

▪ The appraisal of the current aluminum market by the sales manager of one of the major U. S. producers sounds almost like a topographical survey.

"The market is on a plateau—a very flat plateau," this sales executive told The IRON AGE late last week. "It has been on this plateau for some months now. And it is likely to stay here through the rest of 1960.

Look to 1961—"We pretty well know now how October and much of November are going to shape up," he says. "There is no sign yet of any real pickup. I look for an improvement in the market in the first quarter of 1961, with a possibility it will start very late this year.

"The upturn will very likely be gradual," he says. It will probably be in effect for a short period before it is clearly recognized. This means that even if business starts to pick up very late this year, it won't be widely felt until 1961.

Opposite Trend—"Near the beginning of the year most of our people were looking for business to improve about 8 pct over 1959. The way it looks now, we will wind up, 1960 about 8 pct below 1959," reports this sales chief.

Does this make 1960 a bad year for the aluminum industry?

Men in the industry pretty well agree that it depends on what you are comparing it with. From the viewpoint that business was off from 1959, and very definitely didn't live up to expectations, 1960 was something less than a good year.

But the chief executive of another aluminum company points out that business done by the industry this August, traditionally a slow month, tops any month of any year—except 1959.

New Gains—Despite the obvious sag in orders, the sales executive of the major producer isn't disappointed with the specific performance of many of the major aluminum markets.

He calls the sales to transportation and building products markets "satisfactory, and not wholly unexpected."

Progress made in the container and packaging markets in 1960 was "very exciting" to this aluminum man. He looks for even more progress in 1961, particularly in aluminum for beer cans and for closures.

However, the "apathy of the whole household appliance field" was disappointing to this executive in 1960.

Copper

Members of the secondary industry at Saranac Lake, N. Y., last week for industry meetings indicated they have clearly written off the Congo as a source of supply for copper for the Free World.

Most of the scrap dealers, smelters and ingot makers said they were not consigning Congo copper behind the Iron Curtain just yet. However the obvious confusion in the area has prompted all to make plans based on little or no metal from the Congo.

Most of the secondary copper men were more concerned with the plight of the brass mills. Mills have been expecting an upturn this month, and thus far it hasn't come.

The copper men at Saranac said that this is having more of a depressing affect on the current market than any other factor.

Aluminum

Late last week Aluminum Co. of America realigned its top management.

Frank L. Magee, president since 1957, was named chairman of the board. Lawrence W. Litchfield Jr., formerly executive vice president, becomes president. And I. W. Wilson, chairman of the board since 1957, becomes chairman of the newly-formed finance committee.

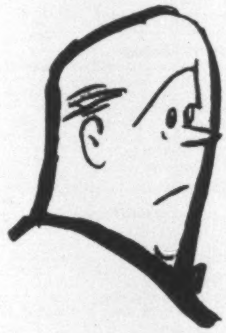
Tin prices for the week: Sept. 13—102.50; Sept. 14—102.00; Sept. 15—102.00; Sept. 19—102.00; Sept. 20—102.00*.
*Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum ingot	26.00	24.70	12/17/59
Copper (E)	33.00	30-33	11/12/59
Copper (CS)	33.00	35.00	3/11/60
Copper (L)	33.00	31.50	11/6/59
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/56
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; Other primary prices, pg. 140.

WHO*
In the best circles you'll find they use only . . .
Ottemiller
CAP SCREWS / SET SCREWS · MILLED STUDS
CUSTOM SCREW MACHINE SPECIALTIES
*Wm H. Ottemiller Co.
YORK, PENNSYLVANIA



PUZZLED...

about personnel problems

Dissatisfied with present recruiting methods? The IRON AGE Employment Exchange is the meeting place for employers and men qualified in all phases of metalworking. For advertising rates, write to Chestnut and 56th Sts., Philadelphia 39.

GOSS and DE LEEUW
MULTIPLE SPINDLE
CHUCKING MACHINES
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GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

PROBLEM SOLVED

Budgit Air Hoists cut maintenance 75%

Specified Plating Company, Chicago, Ill., does all kinds of plating on order. It is a 16-hour day operation.

Budgit Air Hoists cut maintenance costs 75% over electric hoists. The high moisture atmosphere doesn't harm the Budgits, so the maintenance man can now attend to regular duties.

Operators of the Budgit Air Hoists say air is faster, the job is easier, and they keep ahead of the normal work cycle. With higher production speeds, operations are nearly automatic except for dipping.

Ask your Shaw-Box Distributor about Budgit Air Hoists in ¼, ½ and 1 ton capacities and Load Lifter Air Hoists, 1 to 15 tons. Write for Bulletin 15025-1C.

BUDGIT® AND LOAD LIFTER® AIR HOISTS
A product of
MANNING, MAXWELL & MOORE, INC.

Shaw-Box Crane & Hoist Division • Muskegon, Michigan
In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario.

60 A0-3

PROBLEM SOLVED

99-hour week for Budgit® Electric Hoist

Star Machine Company, Spring Lake, Michigan, keeps this Budgit Push Button Electric Hoist on 18-hour service over plating tanks 5½ days a week. Metal stampings are dipped into 11 tanks by the hoist operator. Fast push-button action permits 12 "jogs" a minute — terrific abuse for any small electric hoist, regardless of the application.

Star Machine gets continuous plating service with a complete push-button hoist installation that cost no more than $500. To learn more about this fast, tough, two-brake P:B Budgit Electric Hoist, write for Bulletin 15010-15C — or ask your nearby Shaw-Box Distributor for a free demonstration.

60A-4

BUDGIT ELECTRIC HOISTS
A product of
MANNING, MAXWELL & MOORE, INC.

Shaw-Box Crane & Hoist Division • Muskegon, Michigan
In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/2
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	......	67.9	69.0	77.9	103.1
AZ31B Spec.	......	93.3	96.9	108.7	171.3
Tread Plate	......	70.6	71.7	......	......
Tooling Plate	73.0	......	......	......	......

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)	37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting)	40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	57.13	....	54.86	58.32
Brass, Yellow	50.57	50.86	50.26	54.23
Brass, Low	53.53	53.82	53.22	57.09
Brass, R L	54.58	54.87	54.27	58.14
Brass, Naval	55.12	....	48.68	58.78
Muntz Metal	53.20	....	48.26	....
Momm. Bz.	56.17	56.46	55.86	59.48
Mang. Bz.	58.86	....	52.21	....
Phos. Bz. 5%	77.44	....	78.10	....

Free Cutting Brass Rod........................ 36.

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.	29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be	$65.00
Beryllium copper, per lb conta'd Be	$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading	$70.00
Bismuth, ton lots	$ 2.25
Cadmium, del'd	$ 1.50
Calcium, 99.9% small lots	$ 4.55
Chromium, 99.8% metallic base	$ 1.31
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Germanium, per gm, f.o.b. Miami, Okla., refined	$29.95 to $36.95
Gold, U. S. Treas., per troy oz.	$35.00
Indium, 99.9%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$75 to $85
Lithium, 98%	$9.00 to $12.00
Magnesium sticks, 10,000 lb.	57.00
Mercury, dollars per 76-lb flask f.o.b. New York	$208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel	69.60
Palladium, dollars per troy oz.	$24 to $26
Platinum, dollars per troy oz.	$82 to $85
Rhodium	$137 to $140
Silver ingots (¢ per troy oz.)	91.375
Thorium, per kg.	$43.00
Vanadium	$ 3.65
Zirconium sponge	$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot	
No. 115	29.25
No. 120	28.25
No. 123	27.25
80-10-10 ingot	
No. 305	33.75
No. 315	31.50
88-10-2 ingot	
No. 210	42.00
No. 215	38.75
No. 245	34.00
Yellow ingot	
No. 405	23.75
Manganese bronze	
No. 421	28.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper max.	25.25-25.50
0.60 copper max.	25.00-25.25
Piston alloys (No. 132 type)	27.00-28.00
No. 12 alum. (No. 2 grade)	23.75-24.25
108 alloy	24.25-24.75
195 alloy	26.75-27.75
13 alloy (0.60 copper max.)	24.75-25.00
AXS-679 (1 pct zinc)	24.00-25.00

(Effective Sept. 20, 1960)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½%	24.75-25.75
Grade 2—92-95%	23.50-24.50
Grade 3—90-92%	22.50-23.50
Grade 4—85-90%	22.00-23.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	22¼	20¼
Red brass	25¾	25
Comm. bronze	26½	26
Mang. bronze	20¾	20
Free cutting rod ends.	21¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26½
No. 2 copper wire	24¾
Light copper	22½
*Refinery brass	22¾
Copper bearing material	21¾

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26½
No. 2 copper wire	24¾
Light copper	22½
No. 1 composition	21½
No. 1 comp. turnings	21
Hvy. yellow brass solids	16¼
Brass pipe	14¾
Radiators	17¼

Aluminum

Mixed old cast.	13½—14
Mixed new clips	14½—15½
Mixed turnings, dry	14 —14½

Dealers' Scrap

(Dealers' Buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	23½—24
No. 2 copper wire	21½—22
Light copper	19½—20
Auto radiators (unsweated)	13¼—13¾
No. 1 composition	18 —18½
No. 1 composition turnings	16½—17
Cocks and faucets	13¾—14¼
Clean heavy yellow brass	12¾—13¼
Brass pipe	14¼—14¾
New soft brass clippings	14½—15
No. 1 brass rod turnings	13¼—13¾

Aluminum

Alum. pistons and struts	7½— 8
Aluminum crankcase	9½—10
1100 (2s) aluminum clippings	12½—13
Old sheet and utensils	9½—10
Borings and turnings	5½— 6
Industrial castings	10 —10½
2020 (24s) clippings	12½—13

Zinc

New zinc clippings	7 — 7¼
Old zinc	4½— 5
Zinc routings	3¼— 3½
Old die cast scrap	2¾— 3

Nickel and Monel

Pure nickel clippings	52-54
Clean nickel turnings	40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	23-23.50
Clean Monel turnings	16.50-17
Old sheet Monel	22-23
Nickel silver clippings, mixed	18
Nickel silver turnings, mixed.	15

Lead

Soft scrap lead	8 — 8¼
Battery plates (dry)	3 — 3¼
Batteries, acid free	2 — 2¼

Miscellaneous

Block tin	79 —80
No. 1 pewter	59 —60
Auto babbitt	43 —44
Mixed common babbitt	10¼—10¾
Solder joints	14½—15
Siphon tops	41
Small foundry type	9¾—10¼
Monotype	9¾—10¼
Lino. and stereotype	8¾— 9
Electrotype	7½— 7¾
Hand picked type shells	5¼— 5¾
Lino. and stereo. dross	2¼— 2¾
Electro dross	2¼— 2¾

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Castle, Pa.									7.425* *M10*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1; C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Sept. 19, 1960)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Holloware Enameling *29* ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1,Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1**, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

† Electrogalvanized sheets.

(Effective Sept. 19, 1960)

*7.425 at Sharon-Niles is 7.225

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7,A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*				9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher.

(Effective Sept. 19, 1960)

* Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1	Acme Steel Co., Chicago
A2	Alan Wood Steel Co., Conshohocken, Pa.
A3	Allegheny Ludlum Steel Corp., Pittsburgh
A4	American Cladmetals Co., Carnegie, Pa.
A5	American Steel & Wire Div., Cleveland
A6	Angel Nail & Chaplet Co., Cleveland
A7	Armco Steel Corp., Middletown, Ohio
A8	Atlantic Steel Co., Atlanta, Ga.
A9	Acme-Newport Steel Co., Newport, Ky.
A10	Alaska Steel Mills, Inc., Seattle, Wash.
B1	Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2	Bethlehem Steel Co., Pacific Coast Div.
B3	Bethlehem Steel Co., Bethlehem, Pa.
B4	Blair Strip Steel Co., New Castle, Pa.
B5	Bliss & Laughlin, Inc., Harvey, Ill.
B6	Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7	A. M. Byers, Pittsburgh
B8	Braeburn Alloy Steel Corp., Braeburn, Pa.
C1	Calstrip Steel Corp., Los Angeles
C2	Carpenter Steel Co., Reading, Pa.
C4	Claymont Products Dept., Claymont, Del.
C6	Colorado Fuel & Iron Corp., Denver
C7	Columbia Geneva Steel Div., San Francisco
C8	Columbia Steel & Shafting Co., Pittsburgh
C9	Continental Steel Corp., Kokomo, Ind.
C10	Copperweld Steel Co., Pittsburgh, Pa.
C11	Crucible Steel Co. of America, Pittsburgh
C13	Cuyahoga Steel & Wire Co., Cleveland
C14	Compressed Steel Shafting Co., Readville, Mass.
C15	G. O. Carlson, Inc., Thorndale, Pa.
C16	Connors Steel Div., Birmingham
C18	Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.
D1	Detroit Steel Corp., Detroit
D2	Driver, Wilbur B., Co., Newark, N. J.
D3	Driver Harris Co., Harrison, N. J.
D4	Dickson Weatherproof Nail Co., Evanston, Ill.
E1	Eastern Stainless Steel Corp., Baltimore
E2	Empire-Reeves Steel Corp., Mansfield, O.
E3	Enamel Products & Plating Co., McKeesport, Pa.
F1	Firth Sterling, Inc., McKeesport, Pa.
F2	Fitzsimons Steel Corp., Youngstown
F3	Follansbee Steel Corp., Follansbee, W. Va.
G2	Granite City Steel Co., Granite City, Ill.
G3	Great Lakes Steel Corp., Detroit
G4	Greer Steel Co., Dover, O.
G5	Green River Steel Corp., Owenboro, Ky.
H1	Hanna Furnace Corp., Detroit
I2	Ingersoll Steel Div., New Castle, Ind.
I3	Inland Steel Co., Chicago, Ill.
I4	Interlake Iron Corp., Cleveland
J1	Jackson Iron & Steel Co., Jackson, O.
J2	Jessop Steel Corp., Washington, Pa.
J3	Jones & Laughlin Steel Corp., Pittsburgh
J4	Joslyn Mfg. & Supply Co., Chicago
J5	Judson Steel Corp., Emeryville, Calif.
K1	Kaiser Steel Corp., Fontana, Calif.
K2	Keystone Steel & Wire Co., Peoria
K4	Keystone Drawn Steel Co., Spring City, Pa.
L1	Laclede Steel Co., St. Louis
L2	La Salle Steel Co., Chicago
L3	Lone Star Steel Co., Dallas
L4	Lukens Steel Co., Coatesville, Pa.
M1	Mahoning Valley Steel Co., Niles, O.
M2	McLouth Steel Corp., Detroit
M3	Mercer Tube & Mfg. Co., Sharon, Pa.
M4	Mid States Steel & Wire Co., Crawfordsville, Ind.
M7	Milton Steel Products Div., Milton, Pa.
M8	Mill Strip Products Co., Evanston, Ill.
M9	Moltrup Steel Products Co., Beaver Falls, Pa.
M10	Mill Strip Products Co., of Pa., New Castle, Pa.
N1	National Supply Co., Pittsburgh
N2	National Tube Div., Pittsburgh
N4	Northwestern Steel & Wire Co., Sterling, Ill.
N6	Northwest Steel Rolling Mills, Seattle
N7	Newman Crosby Steel Co., Pawtucket, R. I.
N8	Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9	Nelson Steel & Wire Co.
O1	Oliver Iron & Steel Co., Pittsburgh
O2	Oregon Steel Mills, Portland
P1	Page Steel & Wire Div., Monessen, Pa.
P2	Phoenix Steel Corp., Phoenixville, Pa.
P3	Pilgrim Drawn Steel Div., Plymouth, Mich.
P4	Pittsburgh Coke & Chemical Co., Pittsburgh
P6	Pittsburgh Steel Co., Pittsburgh
P7	Portsmouth Div., Detroit Steel Corp., Detroit
P8	Plymouth Steel Co., Detroit
P9	Pacific States Steel Co., Niles, Cal.
P10	Precision Drawn Steel Co., Camden, N. J.
P11	Production Steel Strip Corp., Detroit
P13	Phoenix Mfg. Co., Joliet, Ill.
P14	Pacific Tube Co.
P15	Philadelphia Steel and Wire Corp.
R1	Reeves Steel & Mfg. Div., Dover, O.
R2	Reliance Div., Eaton Mfg. Co., Massillon, O.
R3	Republic Steel Corp., Cleveland
R4	Roebling Sons Co., John A., Trenton, N. J.
R5	Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6	Rodney Metals, Inc., New Bedford, Mass.
R7	Rome Strip Steel Co., Rome, N. Y.
S1	Sharon Steel Corp., Sharon Pa.
S2	Sheffield Steel Div., Kansas City
S3	Shenango Furnace Co., Pittsburgh
S4	Simonds Saw and Steel Co., Fitchburg, Mass.
S5	Sweet's Steel Co., Williamsport, Pa.
S7	Stanley Works, New Britain, Conn.
S8	Superior Drawn Steel Co., Monaca, Pa.
S9	Superior Steel Div. of Copperweld Steel Co.
S10	Seneca Steel Service, Buffalo
S11	Southern Electric Steel Co., Birmingham
S12	Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13	Seymour Mfg. Co., Seymour, Conn.
S14	Screw and Bolt Corp. of America, Pittsburgh, Pa.
T1	Tonawanda Iron Div., N. Tonawanda, N. Y.
T2	Tennessee Coal & Iron Div., Fairfield
T3	Tennessee Products & Chem. Corp., Nashville
T4	Thomas Strip Div., Warren, O.
T5	Timken Steel & Tube Div., Canton, O.
T7	Texas Steel Co., Fort Worth
T8	Thompson Wire Co., Boston
U1	United States Steel Corp., Pittsburgh
U2	Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3	Ulbrich Stainless Steels, Wallingford, Conn.
U4	U. S. Pipe & Foundry Co., Birmingham
W1	Wallingford Steel Co., Wallingford, Conn.
W2	Washington Steel Corp., Washington, Pa.
W3	Weirton Steel Co., Weirton, W. Va.
W4	Wheatland Tube Co., Wheatland, Pa.
W5	Wheeling Steel Corp., Wheeling, W. Va.
W6	Wickwire Spencer Steel Div., Buffalo
W7	Wilson Steel & Wire Co., Chicago.
W8	Wisconsin Steel Div., S. Chicago, Ill.
W9	Woodward Iron Co., Woodward, Ala.
W10	Wyckoff Steel Co., Pittsburgh
W12	Wallace Barnes Steel Div., Bristol, Conn.
Y1	Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities		Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
	City Delivery‡ Charge	Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	....	....	....	....
Baltimore**	$.10	8.37	9.71	10.16	10.78	8.94	9.63	9.15	11.90	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	....	....	....
Boston**	.10	9.77	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.72	10.35	10.30	10.89	8.56	9.06	8.70	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.13	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	....	....	....	20.84
Detroit**	.15	8.98	10.61	10.65	11.26	8.93	9.62	9.01	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	10.03	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.59[1]	11.29	12.20	11.29	9.82	10.54	9.67	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.99	10.20	....	11.39	10.27	10.48	10.07	12.89	....	....	....	....
Milwaukee**	.15	8.86	10.49	10.44	11.03	8.70	9.28	8.84	11.04	17.24	16.24	21.24	20.49
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	....	....	8.90	8.65	9.20	8.90	10.70	....	....	....	....
Philadelphia**	.10	8.95	10.10	10.76	10.95	9.30	9.95	9.35	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.13	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	19.70	20.45
Portland**		10.20	12.05	12.35	12.20	10.35	10.80	10.20	16.65	18.50	17.45	20.75	20.25
San Francisco**	.10	10.27	11.79[2]	11.55	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.92	10.75	10.68	11.09	8.77	9.29	8.92	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.74	10.99	11.16	8.83	9.33	8.97	11.64	....	16.69	....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Sept. 19, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	...	...	...
Birmingham *W9*	62.00	62.50*	66.50	...	...
Birmingham *U4*	62.00	62.50*	66.50	...	...
Buffalo *R3*	66.00	66.50	67.00	67.50	...
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	...
Chester *P2*	63.00	68.50	69.00	...	...
Chicago *I4*	66.00	66.50	66.50	67.00	...
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	...
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	...	...	...
Geneva, Utah *C7*	66.00	66.50	...	...	...
Granite City *G2*	67.90	68.40	68.90	...	...
Hubbard *Y1*	...	...	66.50	...	...
Ironton, Utah *C7*	66.00	66.50	...	...	...
Lyles, Tenn. *T3*	...	...	...	...	73.00
Midland *C11*	66.00	...	...	...	...
Minnequa *C6*	68.00	68.50	69.00	...	...
Monessen *P6*	66.00	...	...	...	...
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	...	66.50	67.00	67.50	...
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	...	66.50	67.00	...
So. Chicago *R3*	66.00	66.50	66.50	67.00	...
So. Chicago *W8*	66.00	...	66.50	67.00	...
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66-00	66.50	66.50	67.00	...
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	...	...	66.50	...	...

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Discount Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* wensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Discount Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Sept. 19, 1960)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld	Merch. Wire Galv.
	Col	Col	Col	Col	Col	¢/lb.	¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	...	...	...	...	...	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	...	...	...	...	...	9.00	9.55
Cleveland *A6*	...	...	...	...	...	...	...
Cleveland *A5*	...	...	...	...	...	9.00	...
Crawf'dsv. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	...	...	...	...	...	...
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	...	...	...	...	...	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	...	...	...	...	...	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	...	...	...	236	...	9.95	10.50
SparrowsPt. *B3***	175	...	...	215	198	9.10	9.775
Struthers, O. *Y1**	...	...	...	...	...	8.65	9.20
Worcester *A5*	179	...	...	...	...	9.30	9.85
Williamsport *S5*	...	...	...	...	...	...	...

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50	......	......	......	......	......	......	......	......
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50	......	......	......	......	......	......	......	......
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Fontana *K1*	+6.25	......	+2.25	......	0.75	......	1.25	......	1.75	......	2.25	......	2.75	......	......	......	......	......	......	......	......	......
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50	......	......	......	......	......	......	......	......
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.5
Chicago	139.8
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.)	
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

An important message for the man who buys

STEEL WIRE RODS

Rapid developments in the wire-product field have increased industry's demand for top-quality steel wire rods.

Because of its international reputation for reliability, Sumitomo Metal supplies world markets — America in particular — with 7,000 tons of wire rods every month.

To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.

LEADING PRODUCERS OF STEEL WIRE RODS, PIPE AND ROLLING STOCK PARTS

SUMITOMO METAL INDUSTRIES, LTD.

HEAD OFFICE: OSAKA, JAPAN
CABLE ADDRESS: "SUMITOMOMETAL OSAKA"

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT				
	0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.00	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Rolled elliptical, 18 in. or longer, 5000 lb lots	48.00
Electrodeposited, 5000 lb lots	39.50
Brass, 80-20, ball anodes, 2000 lb or more	53.00
Zinc, ball anodes, 2000 lb lots	20.50
(for elliptical add 1¢ per lb)	
Nickel, 99 pct plus, rolled carbon, 5000 lb	1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium, 5000 lb	1.40

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	65.90
Copper sulphate, 25.2 Cu min, 6000 to 12,000 lbs per cwt	$13.75
Nickel sulfate, 5000 to 23,000 lbs	29.00
Nickel chloride, freight allowed, 100 lb	45.00
Sodium cyanide, domestic, f.o.b. Chicago, 200 lb drums	25.00
Zinc cyanide, 100 lb	60.75
Potassium cyanide, 100 lb drum N. Y.	45.50
Chromic acid, flake type, 10,000 lb or more	30.44

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R.	11.50
Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots	25.75
Carbonyl Iron (200 lb lots)	88.00
Welding Grades	8.10
Cutting and Scarfing Grades	9.85
Hydrogen reduced, domestic	11.25

Copper Powders

Molding Grades	
Electrolytic, domestic, f.o.b. shipping point.	15.00†
Atomized	46.5 to 64.5
Reduced	15.00†
Chemically Precipitated	15.00†
Brass, 5000-lb lots	35.1 to 52.2
Bronze, 5000-lb lots	53.1 to 56.7
Chromium, electrolytic	5.00
Lead	7.50†
Manganese, electrolytic	$1.00
Molybdenum	$3.60 to $4.35
Nickel	$1.15
Carbonyl Nickel, 20,000 lb lots	$1.01
Nickel-Silver, 5000 lb lots	60.7 to 69.0
Silicon	70.00
Solder	7.00†
Stainless Steel, 316	$1.07
Stainless steel 304	89.00
Tin	14.00†
Titanium, 99.25 + pct, per lb, f.o.b.	$11.25
Tungsten	$3.15 (nominal)

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† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length)	
		Semi-Processed	Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, C4, A3, J2*)			Sheet (*I2*)
		10 pct	15 pct	20 pct	20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 44.20; 1 side, 36.80.

(Effective Sept. 19, 1960)

REFRACTORIES

Fire Clay Brick

	Carloads per 1000
Super duty, Mo., Pa., Md., Ky.	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays, Latrobe, Pa.	163.00
Chicago District	168.00
Western Utah	183.00
California	165.00
Super Duty	
Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	163.00-168.00
Silica cement, net ton, bulk, Latrobe	29.75
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

	Per net ton
Standard chemically bonded, Balt.	$109.00
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Balt.	103.00

Magnesite Brick

Standard, Baltimore	$140.00
Chemically bonded, Baltimore	119.00

Grain Magnesite

St. ⅜ to ½-in. grains

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

	Per net ton
F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100, 110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size		Seamless		Elec. Weld
	OD-In.	B.W. Ga.	H.R.	C.D.	H.R.
Babcock & Wilcox	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel	2	13	40.28	47.21	......
	2½	12	54.23	63.57	......
	3	12	62.62	73.40	......
	3½	11	73.11	85.70	......
	4	10	97.08	113.80	......

ELECTRICAL POWER
EQUIPMENT IN STOCK

DC MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	3900	New G.E.	Enc. S.V.	475	320
1	3000	New Whse.	Enc. F.V.	525	600
2	2700	G.E.	Enc. S.V.	415	280
1	2250	New G.E.	Enc. S.V.	600	200/300
1	2200	G.E.	Enc. S.V.	600	400/500
2	2000	G.E.	Enc. S.V.	350	280/350
2	1750	G.E.	Enc. S.V.	250	175/350
2	1500	Whse.		600	300/700
4	1500	New Whse.	Enc. F.V.	525	600
2	1400	G.E.	MCF	250	165/300
1	1300	G.E.	MCF-12	300	200/400
1	1200	G.E.	MCF	600	450/600
1	1000	Whse.		500	800/2000
4	1000	GM	DS	600	600/900
2	900	G.E.	MCF	250	180/360
1	850	G.E.	MCF	250	85/170
2	800	G.E.	MCF	250	400/750
2	800	G.E.	MCF	250	780
2	750	G.E.	MCF	600	450/900
1	750	G.E.	M.F.	600	120/360
2	645	S.S.	V.G.	300	1000
4	600	Whse.		250	275/550
1	500	G.E.	MPC-10	250	188/400
2	450	Whse.		550	415
4	400	G.M.	DS	250	300/900
2	400	G.E.	CY-275	300	1000/1500
1	300	Cr.Wh.	H-102 B.B.	230	1200
1	150	Cr.Wh.	CMC-65H	230	1150
1	150	G.E.B.B.	CD	600	250/750
1	150	G.E.B.B.	CDP-125	230	1750
1	125	Cont. B.B.		230	1750
1	100	G.E.	CDP-115	230	1750
1	80	Whse.	SK-123.9	240	2000-4500
1	75	G.E.B.B.	CD-1235-D.P.	600	850

SWITCH GEAR

Large Stock Oil & Air C/BC can furnish in NEMA 1 Enc. or Open Magnetic or Manual Operation. What are your needs & I. C. Requirements.

MG SETS—3 Ph. 60 CY.

Qu.	K.W.	Make	RPM	DC Volts	AC Volts
1	4800	G.E.	450	300	2300/4600
1	2400	G.E.	450	300	2300/4600
1	2000	G.E.	514	600	2300/4600
2	1750/2100	G.E.	514	250/300	2300/4600
1	1750	G.E.	514	600	2300/4600
1	1500	G.E.	720	600	6600/13200
1	1500	Cr.Wh. 4 unit	720	100	2300
1	1000	G.E.	900	600	2300/4000
1	1000	G.E.	720	250	2300/4150
1	1000	G.E.	900	260	4000/6900
1	500	G.E.	900	125/250	440
1	500	G.E.	900	250	2300/4600
1	500 (New)	G.E.	1200	300	2300
1	350	G.E.	900	125	440/2300/4100
1	300	G.E.	1200	250	2300/4000
1	300	G.E.	1200	250	440/2300
1	250	G.E.	900	250	440/2300
1	240	Whse.	900	125	220/440
1	200	Whse.	1200	550	2200
1	200	El. Mhy.	1200	250	2300/4600
1	150	G.E.	1200	275	2300
1	150	Whse.	1200	275	2300
1	150	G.E.	1200	125	440
	140	Cr.Wh.	690	125/250	2300
1	100	G.E.	1170	250	220/440
2	100	Cr.Wh.	S1160	525	220/550
1	100	G.E.	1200	250	2400/4100
2	75	Whse.	1200	125	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
3	3333	Whse.	OISC	1	13800 x 2300
1	3000	A.C.	OISC	3	34500 x 2300
3	1000	G.E.	OA/FA	1	13800 x 230/460
3	833	A.C.	OISC	1	4800/2400 x 480
3	833	A.C.	OISC	1	10175/13475 x 2300/4000
3	750	G.E.	Pyranol	1	4800 x 85/55-255/165
3	500	Mal.	C	1	6600/11430Yx480
3	500	Kuhl	OISC	1	13200 x 6600
3	333	A.C.	OISC	1	6900 x 460
3	200	A.C.	CBS	1	2400/4800 x 240/480
3	150	G.E.	OISC	1	33000x2300/4000Y
3	167	G.E.	HS	1	13800 x 240/480
3	100	G.E.	HS	1	4800/8320Y x 120/240

CRANE & MILL MOTORS
230 V. D. C.

Qu.	H.P.	Make	RPM	Type
12	12/14	Whse.	700/600	MCA-30, Series
1	20	Whse.	975	K-5 Series
2	23	G.E.	650	MDS-408 Shunt
1	35	Whse.	480	CK-9 Comp. S.B.
1	35	Whse.	480	CK-9 Sh. R.B.
1	45	Whse.	600	CK-9 Comp. S.B.
3	50	G.E.	650	COM-1830 Comp.
2	50	Whse.	525	CK-9 Shunt R.B.
2	50	Whse.	600	CK-9 Comp. R.B.
1	50	G.E.	525	COM-1830AEB.B.
1	50	Cr.Wh.	550	SW-50 Comp.
1	60	G.E.	500	MDS-414AE2 R.B.
9	125/165	G.E.	625/575	CO-1832 Ser.
1	100	G.E.	475	CO-1832 S.B.
6	100-140	Whse.	500/415	MC-90 R.B.

Above only partial listing of our available stock.

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Pittsburgh Dealers Are Gloomy

Used machinery dealers in Pittsburgh say business is worse than it was two months ago.

There is also a general lack of confidence which disturbs dealers as much as poor sales. Companies have changed ways of doing business.

■ Deep gloom still dominates the Pittsburgh used machinery picture.

Most dealers say business is worse than it was two months ago. Sales in inquiries are lagging. The mood of buyers is described as cautious and even recession-minded.

The general lack of confidence seems to disturb dealers as much as low sales volume. A supplier of electrical equipment says inquiries are "pretty fair" and some business is being done. Recent orders include a 1500-hp motor for a sheet mill.

However, companies have changed their ways of doing business.

From Up the Line—"You used to be able to get orders from the head of the electrical department," says the dealer. "Now, approval has to come from up the line."

Another sign of the times: A large coal company was interested in buying a motor generator set. Although the company is financially strong, it asked that payments be extended over two years. The dealer had to reject this proposal.

Practices of this kind make dealers wonder if a recession is not already here. Prices in electrical lines indicate widespread weakness. Buying prices of motor generators from 500 kw to 1000 kw have fallen. When a particularly good item is offered, there are still dealers ready to buy but only if the price is right.

Ahead of 1958 — Despite these ominous signs, order volume in the electrical field is still running ahead of 1958. There has been no pickup but the bottom hasn't dropped out yet.

In the general machinery field, one dealer reports interest in vertical and table boring mills. Another says there is some demand for lathes. In both cases, dealers say larger machines are getting the biggest play.

The supply of equipment is a little better, according to one supplier, "but the later types are still bringing fair prices at auctions."

Plants Want and Need—Plants want machinery and need it, says another source, but they are cautious about spending money. And prospects are "definitely buying on price."

"They want something almost new at a fully depreciated price," says a supplier of metal forming tools.

In the materials handling field, inquiries are up a little for one dealer. However, customers are still taking light cranes and conveyors; heavy cranes draw a few inquiries but no buyers.

Steel mill equipment shows no great change. One supplier reports inquiries have fallen off in recent weeks. However, the steel lag may be loosening the supply of equipment.

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

"PACKAGE DRIVES"

FOR ROLLING MILLS & REELS

(1)—3000-HP G.E. Motor, 90/180 R.P.M.

(1)—2000-KW Allis-Chalmers, 600-VDC, M-G Set, with 5000-HP Motor, 13800/6900/4160-Volt.

★ ★ ★ ★

(1)—1500 HP Westinghouse Motor, 300/700 R.P.M. and

(1)—1250-KW M-G Set, 600-VDC with 1750-HP Motor, 2300/4000-Volt.

★ ★ ★ ★

(1)—1400-HP G.E. Motor 165/300 R.P.M. and

(1)—1200-KW M-G Set, 250-VDC with 1750-HP Motor, 2300/4000-Volt.

★ ★ ★ ★

(2)—750-HP Westinghouse Motors, 300/700 R.P.M. and

(1)—3-unit M.G. Set—(2) 600-KW Generators and 1750-HP Motor, 2300/4000-Volt.

★ ★ ★ ★

(2)—235-HP Westinghouse Motors, 325/975 R.P.M.

(1)—500-KW Westinghouse M.G. Set, 250-VDC, with 700-HP Motor, 2300/4000-Volt OR

(1)—3-unit Westinghouse M.G. Set with (2) 250-KW Generators and 700-HP Motor, 2300/4000-Volt.

All M.G. Set Drive Motors are Synchronous, 3-phase, 60 cycle. Will sell any of these items separately.

Can furnish any type of Starting Equipment for the Synchronous Motors, necessary exciter sets and D.C. Motor Control.

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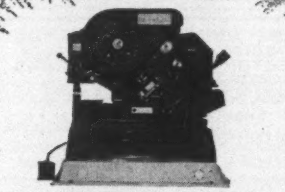

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LATE MODELS—MONEY BACK GUARANTEE

1300-Ton Nat'l Maxipres (Forging Press), 80 SPM, 10″ Str. Air Clutch. Mfg. 1955

920-Ton Toledo #60, Bed 47″ x 72″, Str. 20″

700/390-Ton Toledo #797E, Bed 127 x 83, Double Acting Toggle, Air Clutch & Cushion

600-Ton Ferracute E601, Coining Press, Str. 6″, 30 SPM, MFG. 1950

440-Ton Bliss #210, Bed 37 x 36, 35 SPM, Side Shear, Str. 16″, Mfg. 1953

440-Ton Toledo #59¼, Bed 41 x 48, Str. 12″

255-Ton Toledo #58½B, Bed 43 x 42, Str. 12″

150-Ton Cleve. 60-D-84, Bed 86 x 46, Str. 14″

3000# Chambersburg #30CD "Ceco Drop" Forging Hammers Air or Steam lift, gravity drop, 1951

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4½′ x 15″ MAS-VR4A #4MT, 2500 RPM, Preselection, Hyd. Clamping, Program Control.

12′ x 26″ MAS-VR103, #6MT, 9′ Vert. Cap, 5″ Hole cap., 20 HP, 1400 RPM

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Heavy duty stamping & forging equipt. & machine tools urgently wanted. We pay highest prices for your late model surplus machinery.

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3″ Stroke 1947; Dble. Roll Feed; Scrap Cutter; 30 HP 220/3/60 Varidrive Motor

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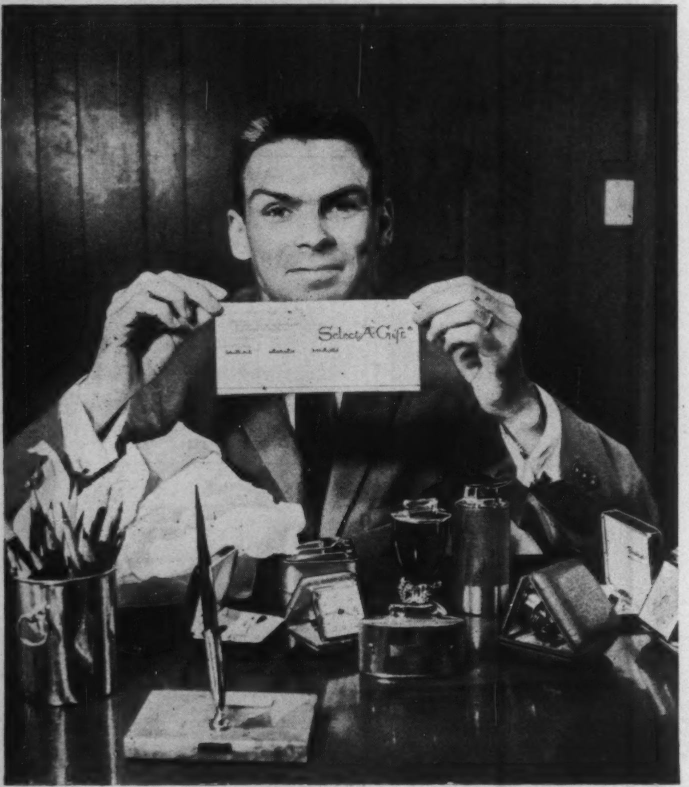

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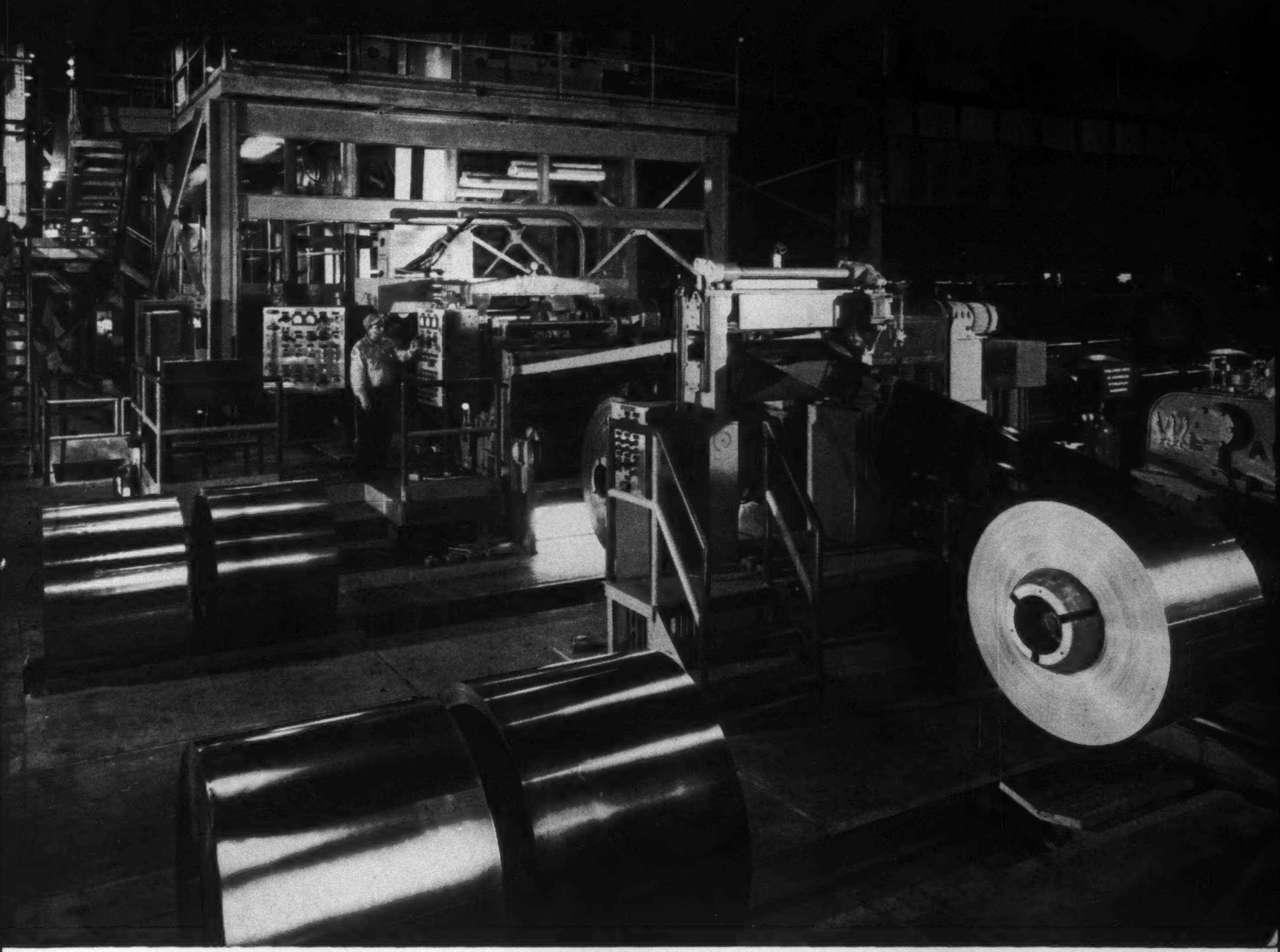

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